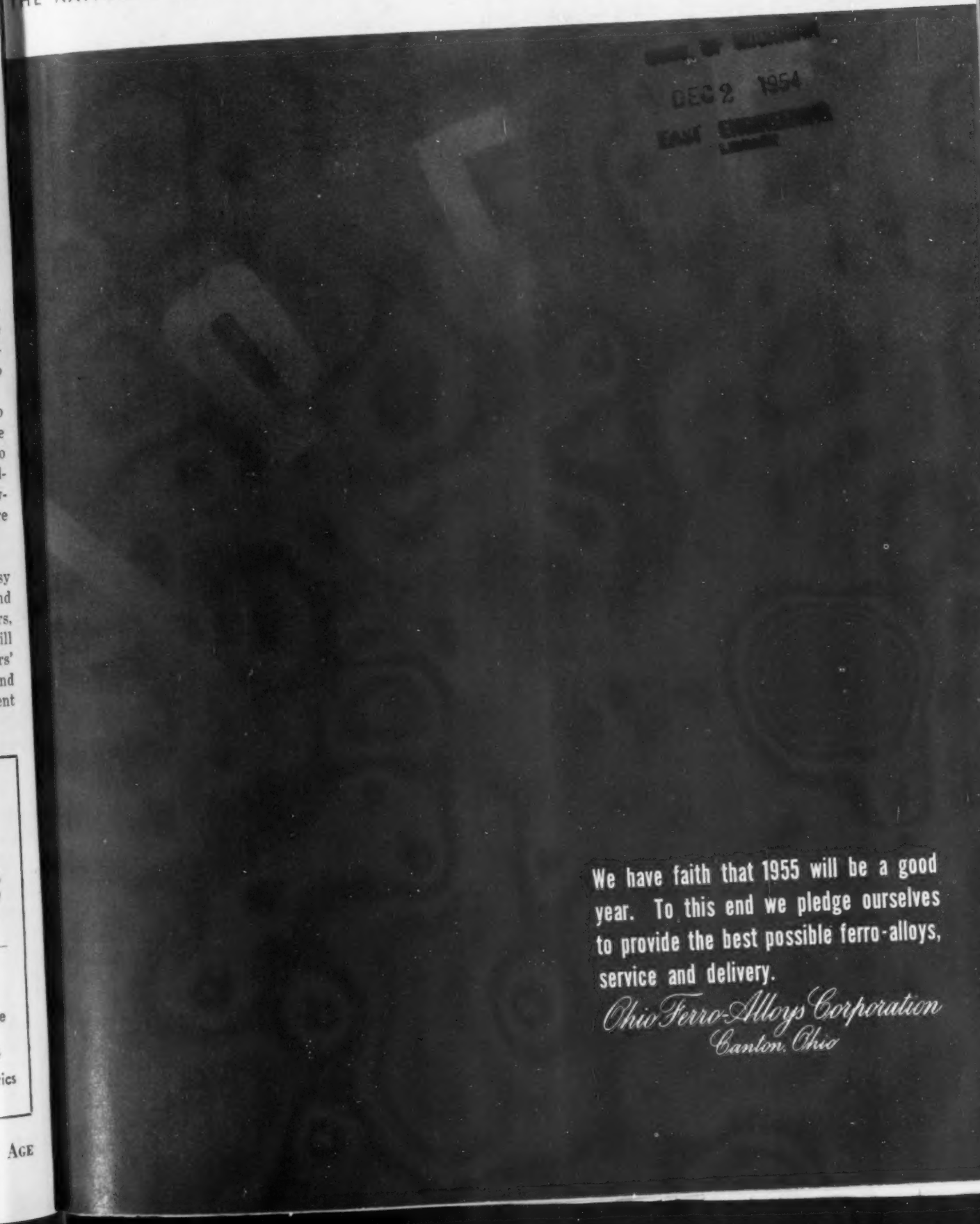
A Chilton Publication

The Iron Age

THE NATIONAL METALWORKING WEEKLY • DECEMBER 2, 1954

Harden new stainless steel by freezing
See page 113

DEC 2 1954



We have faith that 1955 will be a good year. To this end we pledge ourselves to provide the best possible ferro-alloys, service and delivery.

Ohio Ferro-Alloys Corporation
Canton, Ohio

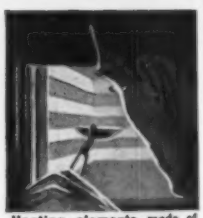
How Hot can a Jet Get?

Whoooosshh! Jet engines generate a powerful amount of heat . . . heat which, uncontrolled in flight, would cause disastrous metallurgical distortions within the delicately balanced engine. So the problem is . . . or rather *was* . . . how to provide a dependably accurate means of measuring exhaust temperatures so that the pilot might have control over how hot his jets get.

And the answer? Special wiring harnesses running from engine to instrument panel . . . harnesses now made exclusively with Hoskins Chromel-Alumel thermocouple alloys.

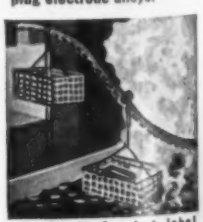
Yes, wherever durability and accuracy are required in a thermocouple . . . whether for jet engines or industrial furnaces . . . you'll find Chromel-Alumel *right* for the job. Extremely durable . . . highly resistant to heat, corrosion, oxidation . . . guaranteed to register true temperature-E.M.F. values within specified close limits.

That's only part of Hoskins' product picture, though. Other specialized quality-controlled alloys developed and produced by Hoskins include: Alloy 785 for brazing belts; Alloy 717 for facing engine valves; special alloys for spark plug electrodes; Alloy 502 for heat resistant mechanical applications. And, of course, there's Hoskins CHROMEL . . . the *original* nickel-chromium resistance alloy used as heating elements and cold resistors in countless different products.



Heating elements made of Hoskins Chromel deliver full-rated power throughout their long and useful life.

Sparks fly better, last longer in today's spark plugs . . . thanks to Hoskins' spark plug electrode alloys.



Hot stuff for hot jobs! Hoskins Alloy 502 is ideally suited to many mechanical-structural applications.

Chromel® NICKEL CHROMIUM WIRE

HOSKINS

MANUFACTURING COMPANY

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DEC 2 1954
EAST ENGINEERING
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Meet the man who softens up the sheets

We're in the annealing room at Bethlehem's Sparrows Point sheet mill. Over there is Carl, the floorman, directing the furnace into position as he gets an annealing cycle under way.

Sheets come off the cold mill hard, brittle, virtually unworkable. Annealing gives them softness and ductility, through an appropriate cycle of temperature and time.

As floorman, it's Carl's responsibility to keep a close check on annealing schedules, make sure the right coil gets to the right furnace, see that it's loaded on the proper annealing base, and in the right position. He inspects the base fans to see that they are working perfectly so they'll circulate the heat efficiently through the furnace.

Details? Of course! But every last one must be handled just right, so that each batch of sheets gets the annealing the customer's requirements call for.

In handling his job Carl gets the stimulation any good man derives from the knowledge he's playing on a crack team. At both our Sparrows Point and Lackawanna plants, sheet-making operations, from slab-scarfing right on through to the shipping platform, are in the practiced hands of keen, quality-minded men. The steel they work with is top quality. The equipment they use to scarf it, heat it, roll it, pickle it, anneal and temper it, is second to none.

Good men, good steel, good equipment —that combination is bound to spell a good product. We'd rather not go so far as to claim that Bethlehem sheets are better than those our able competitors make. But this much we *will* say: that when you order Bethlehem sheets you can be sure of a product that, at the very least, will compare favorably with the best the industry is making. Sheets as finely finished, as easy forming, as true to gage, as any on the market. Sheets as fine as you can buy!

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM SHEETS

the Iron Age

Vol. 174, No. 23, December 2, 1954

DIGEST OF THE WEEK

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NEWS DEVELOPMENTS

METALWORKING CENSUS AIDS SALES PLANNING—P. 65
Marketing and sales executives now have a new and valuable tool for mapping sales programs and measuring sales performance. Revised Basic Marketing Data, just completed by The Iron Age Market Research Div., is an original census of the metalworking industry. It has been extended to 4 digit Standard Industrial Code breakdowns. And availability of this data by areas makes it relatively easy to find out how big your markets are and where they are.

SLOW GREAT LAKES ORE SEASON ENDS EARLY—P. 71
Iron ore shippers on the Great Lakes call '54 the poorest season in 15 years. Total season shipments will be about 60.8 million tons.

GIFTS CAN SAVE ON INCOME, DEATH TAXES — P. 72
If you really want to save on both inheritance and income taxes, one of the very best ways is through gifts to your heirs while you are still alive. If you can afford it, a program of lifetime giving can be an important part of your estate planning. But remember that the gifts must be outright and irrevocable. Be sure you leave yourself enough to live on after you have retired and are no longer earning.

PRESSURE ON STEEL WILL RUN INTO '55 — P. 83
Steel demand will continue to grow between now and the end of the year and will extend into early '55. There may be some slackening of orders near the middle or end of the first quarter. Then a new buying surge will develop as consumers start hedging against a possible price hike or strike. See chance of 8¢ per hour wage increase for steelworkers accompanied by $3 to $4 steel price rise.

PREDICT 50 MILLION GM CARS IN 15 YEARS — P. 86
President Harlow H. Curtice predicts that General Motors will have produced 100 million cars by 1970. First 50 million took 46 years. Sees auto industry producing 5.8 million passenger units in 1955. Mr. Curtice declared that UAW's demand for guaranteed wage could not be applied in the auto industry due to the seasonal pattern of car sales and production.

AIR FORCE PLANNING 80-TON TRANSPORTS — P. 9
Huge new planes would carry payloads nearly thr times greater than largest present models. They mi herald factory-to-battle-zone delivery.

DIGEST OF THE WEEK

ENGINEERING & PRODUCTION

NEW ALLOY BRIDGES STAINLESS SERIES — P. 113
Development of a new stainless alloy, AM 350, bridges the gap between the 300 and 400 series. The annealed alloy is essentially austenitic with good ductility but, unlike the 300 series, it can be hardened by heat treatment. Hardening by sub-zero cooling is preferred.

MODERN CENTERLESS GRINDING, PART II — P. 117
Workfeed methods for centerless grinding include infeed, through feed and end feed techniques. Experts have devised some combinations of the basic feed methods to cut time and costs on tough jobs.

"SEALED CYCLE" HARDENS SMALL PARTS — P. 120
A sealed cycle batch-type furnace setup maintains a controlled atmosphere in vestibule, furnace and quench to harden small parts with minimum distortion. A hot oil quench at 325°F is used without excessive loss of oil. Case hardening to precise limits with negligible distortion permits honing instead of internal grinding on critical transmission gears and similar parts.

NEW COKE OVEN TO BE RESEARCH TOOL — P. 124
A new pilot plant coke oven of advanced design may well be the coke producer's research tool of the future. Small enough to be practical for multiple testing, it still has many characteristics of the full-sized unit. Following the prototype, this mode has been modified for convenience and more valid results.

INVENTORY CONTROL YIELDS MORE PROFIT — P. 126
Money invested in inventory should earn a maximum profit. Being out of stock means lost sales, but carrying too much stock may eventually call for selling at a loss. An up-to-date inventory control system is one of management's best money making tools. It takes care of getting the right quantity of the right merchandise in the right place at the right time.

MARKETS & PRICES

STAINLESS STEEL PRICE PRESSURE MOUNTS — P. 68
Last week's nickel price increase may be the last straw for stainless producers who held the line against higher prices after the last wage increase. Weak market dictated that they absorb the greater labor impact but the market is strengthening now.

STEEL INVENTORY BUYING POLICIES VARY — P. 69
Are consumers buying steel faster than there're using it? Nearly half the purchasing agents queried by Iron Age said they've already built up stocks to a point higher than 6 months ago—but their plants are producing faster, their sales are better. Some are extending inventory, others still cutting.

HOME STEEL OUTPUT THREATENS TRADE — P. 77
British survey shows world steel trade is in a gradual decline largely as a result of growing capacity in former colonies and have-not nations. Schuman Plan countries, totaling nearly 18 pct of Free World steel production, have 64 pct of exports.

STEEL MARKET STILL GROWING TIGHTER — P. 161
Steel consumers continue to take up the slack in the market at a fast pace. Automakers are in many instances placing orders beyond the normal lead time. Size of orders indicates exceptionally good business at least through the first quarter. High carbon wire is at least as tight as cold-rolled sheets. Buying by appliance makers is again moving up, indicating a strong production surge at a time when output generally goes into a seasonal deep-freeze.

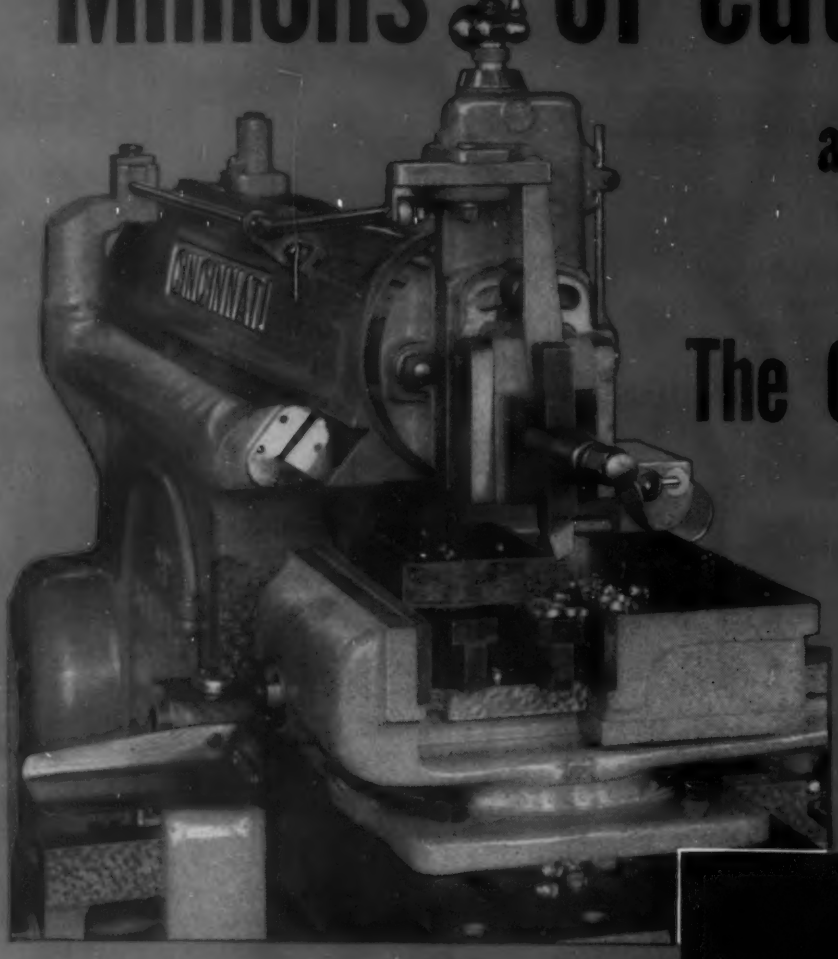
RISING COSTS DRIVE UP NICKEL PRICE — P. 168
Higher production of strategic—and still critical—nickel does not come easily. Rising cost of winning metallic nickel from the earth has caused International Nickel Co. to boost the price of refined nickel 4.5¢ per lb to 64.5¢ f.o.b. Price had been held constant since Jan. 14, 1953.

NEXT WEEK:

CONTINUOUS MAGNESIUM CASTING PROVES SUCCESS
Magnesium rounds and rolling ingots are continuously chill cast at Dow Chemical's Midland, Mich., plant. The process is successful, practical and economical. Virgin ingot and process scrap are melted, refined, alloyed and pumped to water-cooled molds. Temperatures, volumes and pressures involved in the process are continuously charted for close quality control.

MODERN CENTERLESS GRINDING FASTER FOR PARTS
In concluding this 3-part series, the author points out that automatic loading hoppers and power-driven conveyors can cut centerless grinding costs. Used with batteries of grinders, loading and transfer devices boost production and simplify machine sizing and resetting. Excellent hoppers are available for through-feeding or infeeding.

Millions of cuts without a fault...



The CINCINNATI Tool Lifter!

The dependable Cincinnati Tool lifter, with positive return and lift, eliminates tool damage—operates at high speeds—and with angular settings of tool slide or clapper box. Protects and permits use to maximum advantage of carbide or high speed cutting tools.

After simple setting it is automatic, relieves operator and increases production.

Write for Shaper Catalog N-6.

CINCINNATI

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CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

dear editor: *letters from readers*

Likes Editorials

Sir:

Again I say congratulations, but this time not for one but two editorials. I am referring to your editorials of Aug. 12 "Trading With The Enemy" and Aug. 26 "We Have To Do Both."

If it is not too late, I would like to have some tear sheets of both editorials for use here. *G. D. O'Neill, Asst. to Chief Engineer, The Baltimore & Ohio Railroad Co., Engineering Dept., Baltimore.*

Metallurgists Needed

Sir:

I just read your special report "Metallurgists: Need Is Critical" in the news section of THE IRON AGE issue of Oct. 21—very interesting and enlightening.

In your findings of the average starting wage of $380 per month, you must have missed our company—if included that average would be lower.

The graph depicting earnings for years of experience is quite high for our concern: the chief metallurgist is about the only one over the highest figure with one or two of the assistants near the figure. Several of the metallurgists, including myself, have from 10 to 20 years' experience and make near or less than the figure you quote for 1 to 5 years. We are told by our superiors that we receive at or above average pay in industry for job and experience.

Rare is the day in our mill that anyone of the Metallurgical Dept. doesn't "dirty" his hands. If the steel companies aren't obtaining the trained men they need and your chart is accurate, I wonder why I fail to hear from applications to steel concerns after my present wages are mentioned.

Your story concerning the presentations sponsored and programmed by the American Society for Metals is the one bright spot.

It is this unfortunate metallurgist's observation that many concerns discourage youth from a metallurgical career by employing high school graduates—so as to pay less wages—to do routine and some special testing work. As a result the graduate metallurgist wants the more technical work to start. *Name Withheld, 17 Years' Steel Mill Experience.*

Centrifugal Casting

Sir:

In reading your Oct. 28 issue, I noticed an article on p. 95, by your metallurgical editor, W. D. Latiano, which is very well written and very informative, concerning centrifugal casting methods at Sandusky Foundry & Machine Co.

We wondered whether it would be possible to send us a tear sheet or possibly two tear sheets of this article. We certainly would appreciate having them for our files. *O. B. Frohman, Consulting Engineer, Ampco Metal, Inc., Milwaukee.*

Nickel Plating

Sir:

We would like very much to have two tear sheets of an article which appeared in the July 8 issue. This article is entitled "Extend Applications of Nickel Immersion Platings" by A. E. Durkin. *G. S. Miller, Sales Promotion Dept., The Cuno Engineering Corp., Meriden, Conn.*

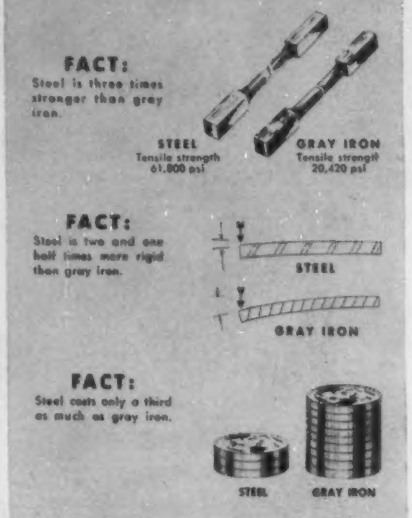
Die Casting

Sir:

I would appreciate it if you would mail to my attention three tear sheets of an article appearing in your Sept. 2 issue entitled "New Die Casting Plant Features Melting, Handling Economies." *H. Campbell Stuckeman, Vice-President, Rockwell Mfg. Co., Pittsburgh.*

FACTS THAT FIGURE

in lower costs



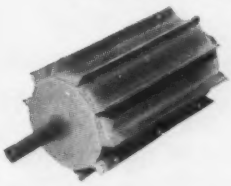
AND SO... *by manufacturing your products from welded steel, costs can be reduced an average of 50%.*

HOW YOU CAN CUT COSTS...NOW

BECAUSE steel is stronger, more rigid than iron, yet costs a third as much per pound, costs on many products can be cut up to 50%.

Savings like this can be realized on *your* products without disrupting production. Simply change over your designs one part at a time.

COSTS 45% LESS



Feeder roll is built from standard channel welded to steel discs. Steel design eliminates breakage, weighs half of former casting. Saves 45% on cost of manufacture.

COSTS 30% LESS

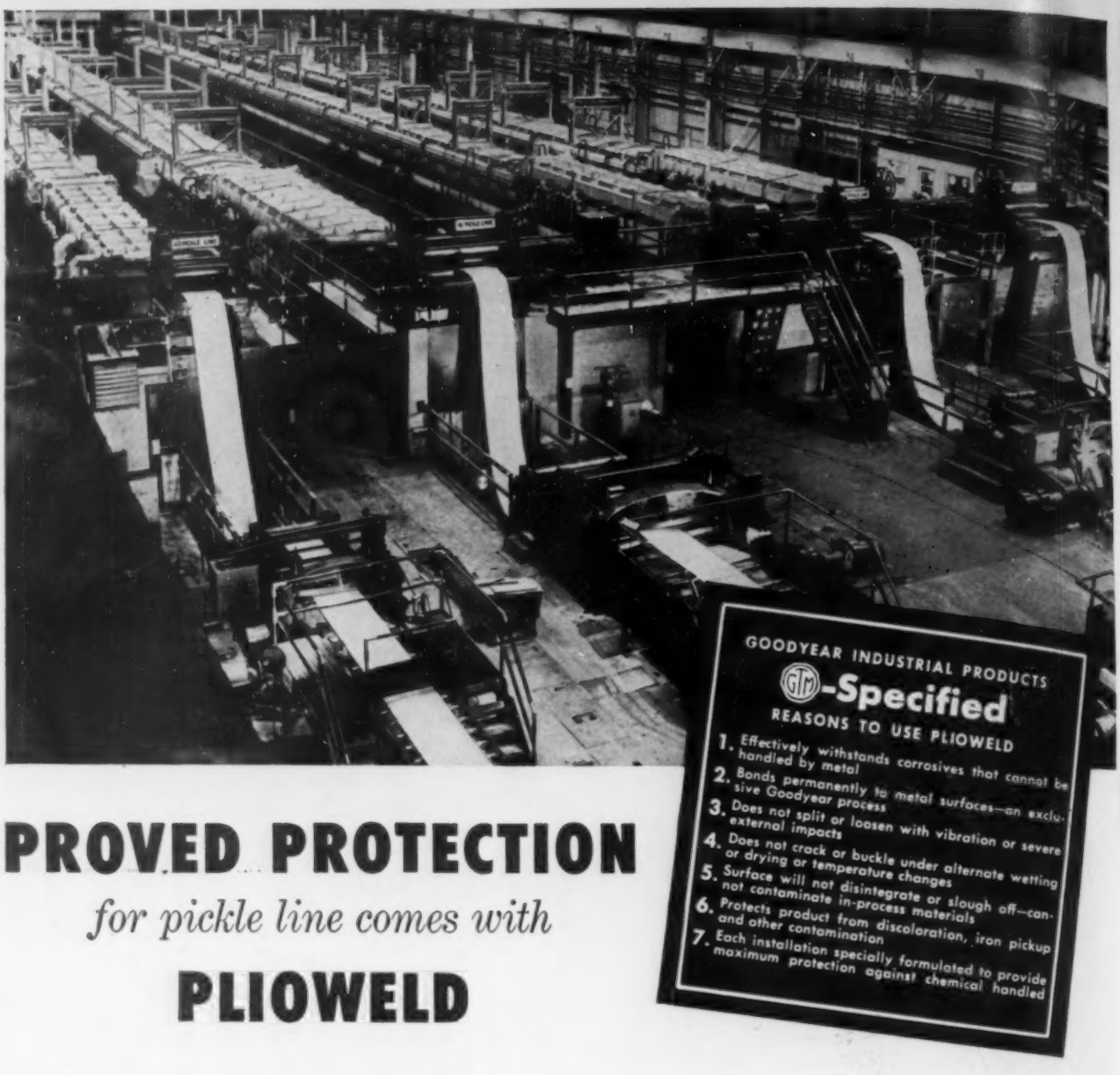
Machine bracket is welded from 10 gauge metal. Weighs half as much as original cast design. Costs 30% less to produce.

A Lincoln representative will gladly work with you to cut your production time. He can show you how to simplify design details . . . cut costly man-hours. Call him or write on your letterhead.

THE LINCOLN ELECTRIC COMPANY

Dept. 1513, Cleveland 17, Ohio

THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT


GOODYEAR INDUSTRIAL PRODUCTS
GTM-Specified
REASONS TO USE PLIOWELD
1. Effectively withstands corrosives that cannot be handled by metal
2. Bonds permanently to metal surfaces—an exclusive Goodyear process
3. Does not split or loosen with vibration or severe external impacts
4. Does not crack or buckle under alternate wetting or drying or temperature changes
5. Surface will not disintegrate or slough off—cannot contaminate in-process materials
6. Protects product from discoloration, iron pickup and other contamination
7. Each installation specially formulated to provide maximum protection against chemical handled

PROVED PROTECTION

for pickle line comes with

PLIOWELD

Acid tanks. Hot and cold water tanks. Tank covers. Piping. Drip pans. Fume ducts. Fume scrubbers. Exhaust fans. Stacks and breeching. These are the points in a pickling line that can be thoroughly protected against chemical attack with rubber bonded to metal—with PLIOWELD.

Secrets of the proved success of PLIOWELD in combating corrosion—and abrasion—are its availability in a range of compounds to meet specific needs and its permanent bond to metal. PLIOWELD does many jobs well and once on the job, it stays there.

Whether your problem is handling acids or alkalies, salts, alcohols, fumes, water or abrasive slurries, the G.T.M.—Goodyear Technical Man—can show you how to improve production and lower costs with PLIOWELD linings and coverings. He also can give you interesting information on rubber covered rolls. For details, see the G.T.M. or write: Goodyear, Industrial Products Division, Akron 16, Ohio

YOUR GOODYEAR DISTRIBUTOR *can quickly supply you with Hose, Flat Belts, V-Belts, Packing or Rolls. Look for him in the yellow pages of your Telephone Directory under "Rubber Products" or "Rubber Goods."*

GOODYEAR

THE GREATEST NAME IN RUBBER

Plioweld—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

fatigue cracks

by William M. Coffey

Just Send the Money

"Send $1 to Bill Coffey Week" has come and gone with this loot carefully stashed away in the Coffey Foundation strongbox: two real, one dollar bills, American; un peso, Mexican; a very tired old overcoat button; one lira, Italian, several kind notes, and one not so kind.

We are appropriating 4¢ of the fund to hang a commemorating plaque in our cider cellar to establish the immortality of the donors "whose magnificent generosity in the face of pessimism and doubt should inspire others to do likewise."

Our nicest note came from Mary Liz Harter whom we remember to be a very gracious little girl puzzler fan from El Paso, Texas—

"Muy estimado amigo:

Para semona de Coffey yo no tenga un dolar pero aqui Vd. Tiene un peso para el pavre Sr. Coffey. Par favor continue los ecertijos quisera a Vd. ricos."

(*Rough translation: I don't have a dollar to give you but here's a peso for the poor Mr. Coffey. Please continue the puzzles. I would like you to be rich.*")

Mr. Bart Shapleigh of the Bethlehem Steel Company said:

"Altho B. C. Weeks does not begin until Nov. 23 my accounting department is right on its toes and wishes to be the first to bill Coffey. After all, with all your friends in the ffj, and you can count me in, it might be well to be the first to bill you. Or do you have a million dollars earmarked? Attached, therefore, is my bill."

(*And it was, too. Only it was a bill to me, not for me. Disqualified.*)

. . . and the not so nice note came from a Stanley J. Smith, unknown Chicago connection. It read thusly:

"Collector Internal Revenue
Stamford, Conn.

Attached is a tear sheet from IRON AGE suggesting that $1 bills be sent to William Coffey, Stamford, Conn. My reason for mailing this to you is so that you can watch this man's income tax return for 1954, to see that it includes these extra dollars that he will receive."

(*No dollar was enclosed, naturally*).

The best, of course, came from W. P. Bascoe and George Masner. They sent real money.

. . . and, please, next time will you do the same? Please just send money. Say, just a little bit after Christmas? And just money? Please.

Puzzlers

Charlsie, Dale Letterman and the GSCC (now disguising themselves as XXXX). Arlan Walker, R. H. Messinger, Fred P. Boulais, Bayrer, H. A. Grannel, Myron Bowerman, Gerald Connolly, Sidney Elsen, Lee Fields, Roy Follette, Mary Gilbert, C. K. Harris, Alvin Caplow, Paul B. Coffman, Harry B. Day, J. M. Gaffney, Alfred M. Gladstone, Richard Collen, Lester Rodney, A. R. Morley, William Murray, Herman Muscott and Louis Hausman all said 2 cubic centimeters is the answer to our Oct. 28 puzzler. This is keerect. This is one of the longest list of winners we've ever had. Good thing we don't give prizes.

New Puzzler

A snail at the foot of a 20-ft-high fence with a sharp toe decides to get over the fence to the opposite side on the ground.

In 12 hours of daylight he can climb 3 ft up, in 12 hours of night he slides 2 ft down. How long will it take him to get over the fence?

This one donated by Wm. E. Voronovich, General Foreman, The Lewis Machine Company, Cleveland. Thanks a million.

now you can produce
trouble-free,

FREE-MACHINING STEEL
with
FOOTE MANGANESE SULPHIDE

This fume-free ladle additive increases quality and reduces the cost of producing high sulphur, free-machining steels . . . with these plus advantages:

1. *improved hot rolling behavior*
2. *fewer surface defects*
3. *fewer diversions*
4. *lower conditioning costs*
5. *low carbon content saves heat time*

TYPICAL ANALYSIS	
Manganese	53%
Sulphur	32%
Carbon	.22%
Size: 1" x 5" lump	

write for further details!

Foote MINERAL COMPANY

438 Eighteen W. Chelten Bldg.
Philadelphia 44, Pa.

NOTICE

TO AIR FRAME AND ENGINE BUILDERS, DESIGNERS, ENGINEERS AND THOSE RESPONSIBLE FOR PRODUCTION

THE BATH RADIAL DRAW FORMING PROCESS
has proven these advantages in the production of parts:

1 **Reduces Weight while Adding Strength**
The Priceless weight on wings

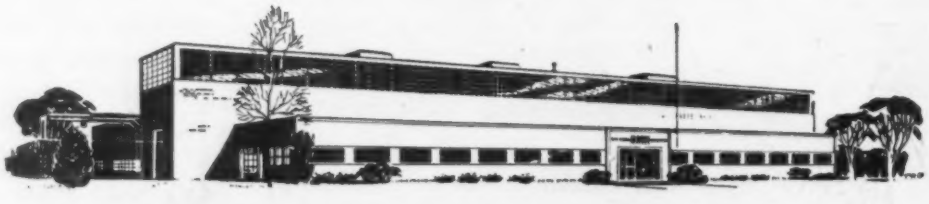
2 **Conserves Supply of Strategic Materials**
Makes no chips but holds Machining Tolerances

3 **Produces Parts in Minutes that now take Hours**
In steel or aluminum alloys

4 **Makes Large and More Complex Parts, thereby reducing Joints**
Works in either sheet or aluminum alloys and produces shapes up to 360°, either circular or rectangular with changing angles

5 **Imparts Constancy to Metallurgical Qualities**
Reduces the need for stress relieving

Backed by millions of dollars of equipment in use
and 40 years experience in the Metal Forming Field.



THE CYRIL BATH COMPANY

32320 Aurora Road • Solon, Ohio
(Located in the Greater Cleveland Area)

MANUFACTURERS OF RADIAL DRAW FORMERS • DIES • TOOLS •
PRESS BRAKES • TANGENT BENDING SEQUENCE PRESSES • PRESS TYPE BRAKES • SPECIAL MACHINES

The Iron Age Newsfront

Use Ductile Iron for Hollow Crankshafts

A hollow automotive crankshaft, reported superior in some respects to ordinary forged shafts, will be made in Europe from ductile iron. The new and radical design is being promoted by German designers. Several 1955 sports models are expected to use the ductile iron hollow crankshafts.

More Refractories "Blown On"

Air-gun placement of castable refractories is becoming more prevalent in industry. Air placement eliminates costly form work, reduces labor costs, gives greater density and strength, enables maintenance without removal of original lining. Castables now account for about 2 pct of total value of all refractories in U. S.

Wages: Labor's Hand Looks Stronger

Higher wage costs are likely again in 1955. Healthier tone of the economy will strengthen labor's hand at the bargaining table—and labor did all right with a weaker hand in '54. United Automobile Workers and United Steelworkers will set the "pattern" in second quarter bargaining.

GAW: But Industry Plays Close to the Vest

A complete blackout of guaranteed annual wage comment has descended over the auto industry. Former background and off-the-record labor sources have completely dried up. This reflects industry concern over the situation and determination not to tip its hand in any sense.

May Pare Nuclear Power Costs

Significance of the light water reactors at Arco and Chicago (the latter now building) must not be overlooked. The envisioned reactor would eliminate expensive heat exchangers and liquid metal coolants, and use light water as both coolant and power source. Its success could alter economics of atomic power radically.

Ordnance Vehicle Buying Rises

If projected ordnance buying in the Midwest is any indicator, ordnance vehicle purchases in some areas will move up in 1955 by at least 30 pct over 1954 procurement levels.

Aids Study of Lubricating Oil Flow

Effects of rust-inhibitors or detergent additives on the flow of lubricating oils, particularly at low temperatures can be studied with a simplified laboratory tool recently developed. The new instrument, known as a three level capillary viscometer, provides a sealed system in which repeated measurements can be made in an inert atmosphere.

Improved Alloying Agents Needed

Growing importance of vacuum melting and the increasing emphasis on purity is in turn intensifying demands for high purity alloying agents. Electrolytic chromium is one step in this direction but informed sources claim other ferroalloys of greater purity must be developed. Ferroalloy producers are also under pressure to lower oxygen content but at present this is extremely costly.

Carbon Refractories In Blast Furnaces

Application of carbon refractories to blast furnaces will probably continue to be limited to bottoms and hearth and possibly as high as the bosh, according to experimental results obtained by a leading steel producer.

New Sealed Beams Available Soon

The new sealed beam headlamps that have been developed by headlamp makers are expected to be on sale soon in auto parts stores. They will not be available as original equipment, however, until many more states have approved them officially.

Thermocouple Wire Reused

One Ohio steel producer has saved $5000 in a year by salvaging platinum wire used in thermocouples. In use—the wire costs about $1 per inch—becomes pitted. Ends previously discarded are now buttwelded together and used in fresh thermocouple assembly.

Double trepanning increases production 255%

Trepanning cu
heads are threade
the end of the ho
bar. Heads may
body only the tre
ning cutters,
contain both tre
ning and bo
cutters as shown

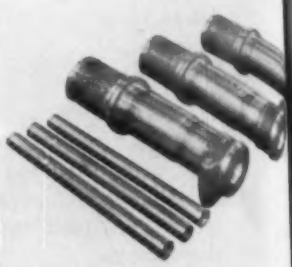
On Axelson 25" Heavy Duty Lathe

supplied as a complete production unit

Trepan boring pays off in more ways than one. Not only is machining time cut to a minimum, but many valuable hours of tool sharpening time are saved and the core material can be used for making other parts such as shafts, collars, gears, etc.

The main secret of doing the job is in the design of the trepanning head and combination trepanning boring head used in the second operation that opens the bore from 3⅞" to 5⅞". Here a tubular core is trepanned but an auxiliary cutter in the trepanning head reduces the tubular core to chips. Carbide cutters are used and a special grind breaks up the chips so that they can be carried out through the hollow boring bar by the high pressure coolant system.

Axelson engineering is now building a complete package trepanning attachment that can be ordered on new lathes or can be installed on Axelson lathes in your plant. If you have the problem of deep hole drilling in solid metal it will pay you to look into the matter and get figures on your work. Just call the Axelson representative in your locality or write direct to the factory at 6150 South Boyle Avenue, Los Angeles 58, California.



Trepanned aircraft landing struts. Photo shows 2⅜" dia. x 32½" long core removed in first operation. Second operation opens the hole from 3⅞" to 5⅞" dia.

PERFORMANCE DATA

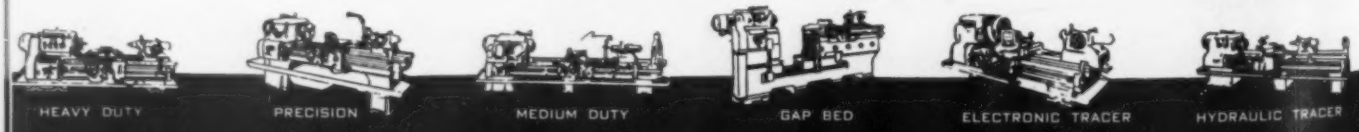
Machine: Axelson 25" Heavy Duty Lathe
Part: Aircraft Landing Strut
Material: Hy-tuf Steel Forging, Wt. 227 lbs.
Hardness: Soft, 30 Rockwell C
Tools: Carbide

A. Trepanning Method
First Operation: Trepan 3⅞" bore, core 2⅜" x 32" long
Feed: .006" per rev.
Speed: 214 RPM
Time: 25.3 min. cutting time
Second Operation: Trepan bore from 3⅞" to 5⅞" dia.
Feed: .006" per rev.
Speed: 108 RPM
Time: 50 min. cutting time
Third Operation: Bore from 5⅞" to 6" dia., and form flat bottom
Time: 4.82 hours
Total floor-to-floor time: 8.62 Hours average

B. Old Method of Drilling and Bo
First Operation: Drill 4⅜" dia. x 32½" deep
Time: 8.4 hours cutting time
Second Operation: Bore from 4 dia. to 6" dia. x 32½" deep form flat bottom
Time: 22.2 hours cutting time
Total floor-to-floor time: 30.6 hours average

C. Production Increase: 255%

D. Note: One end is closed except a 1½" dia. hole through whi an undercut is made to releas the 2⅜" dia. core trepanned the first operation.



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Metalworking Census Aids Sales Planning

Marketing and sales executives can use The Iron Age's revised basic marketing data to help map sales programs . . . It is also useful for measuring sales performance . . . Data by areas show where markets are.

♦ MARKETING and sales executives now have a new and valuable tool for mapping sales programs with publication of the revised IRON AGE Basic Marketing Data. Compiled by THE IRON AGE Market Research Div., under the direction of Oliver Johnson, this original census of the metalworking industry includes:

- A compilation of metalworking plants with more than 20 plant workers, classified by the U. S. Standard Industrial Code (2, 3 and 4 digit breakdowns).
- A breakdown of plants within SIC groups by number of plant workers.
- The number of plant workers in each group.
- A weight index expressing the percentage of total U. S. metalworking plant workers in each SIC group.
- A recapitulation of this information by state and by industrial areas within each state.
- An analysis of manufacturing departments operated by U. S. metalworking plants of 20 or more plant workers. This listing is also broken down by industrial classification and state and industrial area.

How To Use It

THE IRON AGE Basic Marketing Data make it very easy to conduct market surveys of the metalworking industry. Here's what you do:

1. Decide what you want to find out about the use of or market for your product in the metalworking industry as a whole or within certain industry groups.

2. Develop a questionnaire that will provide this information. Be sure to ask also for (a) the number of plant workers employed at the plant, and (b) the major product produced in the plant.

3. Mail your questionnaire to a representative number of plants; or, use your own salesmen or other interviewers to obtain the answers to the questions through personal calls. THE IRON AGE can help you to mail the questionnaire to the right plants.

4. Assign a product code number to each reply, using for this purpose the U. S. Government's Standard Industrial Classification Manual. When you have accumulated a representative number of replies from typical plants in each of the industry groups in which you are interested, then you will have a survey sample of field information.

5. Tabulate the answers to your questions, including also the number of plant workers. Do this separately for each industry group.

6. Project the results of your sample in each group through the use of factors. To find the factor for each separate industry group:

a. Take the number of accumulated plant workers for that group as totalled from your questionnaires;

b. Divide this figure into the total plant employment for that group (as shown in Basic Marketing Data). The quotient is the factor for that industry group.

7. To project the statistical information tabulated from your questionnaires to represent the whole industry group, multiply it by this factor. Each group, one at a time, can be handled in this way.

8. Add up the projections for the individual industry groups, getting an over-all picture for the entire metalworking industry.

IRON AGE census totals show 6,-

How Plants Are Grouped

Major Industry Groups	No. of Plant* Workers	No. of Plants*
Ordnance & Accessories	119,240	101
Metal Furniture	89,987	667
Primary Metals	1,026,898	2,778
Fabricated Metal Products	941,047	7,347
Machinery (except elec.)	1,271,926	6,883
Electrical Mach'y & Equip.	851,594	2,067
Transportation Equip.	1,443,956	1,584
Inst'ments, Photo Equip., Clocks	202,928	643
Misc. Mfg. Industries (metal)	161,901	1,233
U. S. TOTAL	6,109,477	23,303

*** Plants with 20 or more plant workers.**

Geography of U. S. Metalworking Plants

109,477 plant workers employed in 23,303 U. S. metalworking plants. Broken down by major industrial groups, fabricated metal products registered the greatest number of plants—7347, while transportation equipment emerged as the largest employer—1,443,956 plant workers, or 23.6 pct of the total metalworking workforce.

On a breakdown by states, New York leads in number of plants with 2516, followed closely by Illinois with 2514. Top 10 states for location of metalworking plants are, in descending order:

New York	2516
Illinois	2514
Ohio	2510
Michigan	2090
Pennsylvania	2028
California	1774
Massachusetts	1251
New Jersey	1247
Connecticut	929
Indiana	906

Analysis of state totals for plant workers, however, yields a somewhat different ranking. Ohio is the chief employer, with 11.64 pct of the total metalworking workforce, followed by Michigan with 11.50 pct. Top 10 by percent of workforce, again in descending order, are:

Ohio	11.64
Michigan	11.50
Pennsylvania	10.97
New York	10.33
Illinois	9.23
California	6.48
Indiana	5.25
New Jersey	4.77
Connecticut	4.33
Massachusetts	4.24

Machine shops are the most common type of manufacturing department operated in metalworking plants, with 15,340 shops reported. But two welding shop groups, arc and gas welding on product, with 10,850 and resistance, spot, flash, etc., with 7586, together exceed machine shop installations, next most common department is stamping, with 9683 installations, followed by painting, lacquering or otherwise finishing product, with 9857 operating departments.

MAP on facing page shows number of workers and number of metalworking plants with 20 or more plant workers by state totals.

EDUCATION

METALLURGY: Plan New Center

American Society for Metals to found Metal Engineering Institute & University in Cleveland area . . . Will begin in 2 years . . . Plan $1 million budget to start—By *T. M. Rohan.*

◆ AN AMBITIOUS program of expanding metallurgical education including starting a new Metal Engineering Institute and University near Cleveland was being worked out recently by American Society for Metals.

William H. Eisenman, recently re-elected secretary after 36 years consecutive service, said the 5-point expansion involves the new Institute, to be started in 2 years, and a new headquarters building in suburban Cleveland, both of which have been approved by directors. Three additional moves are a new year-round metallurgical seminar in 3 years, a metal research laboratory, and creation of a Metal Science University.

The last three proposals are under study with approval expected in 6 months, according to Mr. Eisenman. About $500,000 has already been set aside for the new building, he added, and by time of approval about $1 million will be available.

Proposed institute would control educational courses now in preparation for a year by authorities on 41 metallurgical and metals engineering subjects so far scheduled. Completion is hoped for in 18 months and courses will be used in local chapter educational courses, in-plant training and home study courses. These are aimed principally at the 24-31 age group who went into service and then to work in the metals field. Mr. Eisenman pointed out that only four courses in metals are now offered by 40 accredited home study institutions.

The Metal Engineering Institute is intended to be self-supporting and "will become the most valuable and continuing asset the ASM has," he said.

Seminars will present 1 and 2-week institutes at an advanced educational level throughout the year.

Bridge the Gap

The metal laboratory, Mr. Eisenman said, would work in a field not now fully covered: the investigation of metals problems of the widest nature, useful to the whole metals refining industry, heat treating, super-power industries and others. Only counterparts are the British Non-Ferrous Metals Research Assn., French Iron & Steel Research Institute, Cintre Technique des Industries de la Fonderie.

In the U. S., he said, present plant laboratories, government labs, commercial testing labs and university and endowed or self-supporting research institutes work on practical problems of limited scope for a limited public. Fundamental research labs such as the University of Chicago's Institute for the Study of Metals are at advanced frontiers of knowledge, he said. The ASM laboratory would work in the gap between these labs.

The proposed university would be staffed with top metal scientists, engineers and researchers, and offer courses in metal science only, beginning with third-year students and continuing through post graduate work.

MARKETING

STAINLESS: Price Pressure Mounts

Nickel price boost may be last straw to hold-the-line stainless producers . . . Held steady after last wage boost despite higher impact . . . And market demand is on the upgrade—*By J. B. Delaney.*

◆ HIGHER LABOR and material costs are straining the "hold-the-price-line" policy of stainless steel producers.

Stainless mills are taking a closer look at production costs versus selling prices following International Nickel Co.'s ½¢ per lb increase in the price of nickel.

"We simply cannot continue to absorb these higher material costs on top of last summer's wage increase," said one sales executive who indicated he favored a compensatory price boost in stainless and other so-called super alloy steels.

Forced To Absorb

The stainless producers have held the price line since 1953. They absorbed last summer's wage boost due to strongly-competitive market conditions plus a recognized competitive duel between stainless and aluminum, chiefly in flat-rolled products.

Chief deviation from this policy came recently when producers were forced to increase the price of columbium and columbium-tantalum bearing grades because of drastically higher ferroalloy costs. Since January, ferrocolumbium has risen $5.60 per lb, while columbium-tantalum went up $1.50 per lb—too much for even the most competitive-minded producer to absorb.

Boosts Cost $9-$10

Steel industry labor costs rose an average of 10¢-12¢ an hr last summer. Impact for the stainless producers was higher per ton due to the higher-than-average man-hours spent in producing and processing. a ton of high alloy steel.

These combined pressures and the improved market situation of recent weeks may be just enough to spell higher prices for stainless consumers. Stainless producers are feeling effect of higher demand from automotive and other consumers.

Higher nickel cost of 4½¢ per lb means an increase of $9-$10 in the cost of producing a ton of finished 18-8 stainless steel. This is based on an average nickel content of 9 pct, and makes allowance for processing losses such as scale, grinding, and pickling losses.

Despite these cost advances, price action in stainless, if any, is likely to be a deliberate move based on competitive as well as cost factors. One executive predicted no "precipitous" action by producers.

The nickel price increase has prompted similar stock-taking by producers of structural alloys. It was pointed out that alloy grade extras were not increased following the last wage go-round between the industry and the United Steelworkers. Due to lower nickel content, price adjustments in structural alloy grades would average less than for stainless steels.

If higher stainless prices materialize, consumers may re-examine their attitude toward the high nitrogen chrome-manganese-nickel steels developed as substitutes for 18-8 types 301 and 302. These substitutes contain less nickel—as low as 1 pct—and have rupture strengths comparable to some 18-8 types. At least one major consumer has continued to use the chrome-manganese-nickel grades despite lifting of nickel controls.

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Training:

Mobile maintenance classroom ends successful year.

More than 4000 fork truck operators and maintenance men from 1500 different firms have taken advantage of Clark Equipment Co.'s mobile training school. During its first year of travel, just completed, sessions have been held in 43 cities of the U. S. and Canada.

Mobile school brings maintenance training right to the customer's plant and supplements Clark's regular 3-week course held in Jackson, Mich.

Equipment for the school is transported in a red and white trailer—a veritable rolling signboard for the company.

STEEL: Inventory Policies Differ

Purchasing men are buying more steel today . . . But plants are using more as their sales improve . . . Many inventories are heavier, but won't last so long . . . Front office holds some buyers—By K. W. Bennett.

◆ ARE CONSUMERS buying steel faster than they are using it? The inventory skeleton peered briefly from the closet last week as a few reports suggested that purchasing agents are overbuying their consumption rate of steel in latter 1954 and early 1955 just as they underbought in the first half of this year.

Nearly half the purchasing agents (in industries other than automotive) queried by THE IRON AGE indicated they have already rebuilt tonnage of steel inventories to levels higher than 6 months ago when an industry-wide inventory cutback was in full bloom. But for most of those contacted, sales and consumption are higher and the inventories won't stretch so far forward. About half are cautiously extending inventories while the others are still cutting or holding even.

Latest report of the National Assn. of Purchasing Agents shows that 26 pct of the buyers were still trimming stocks in November—the smallest percentage this year. And 19 pct were making moderate additions—the largest number in 1954. Note that these figures cover all items bought by industry, not just steel.

Stocks Vs. Sales

A growing number of purchasing agents would frankly like to boost their steel buying, particularly in the Midwest, as mill lead times on flat-rolled items continue to advance. Most do little boosting, however. The front office, recalling the burdensome raw steel inventory of last spring, has been sitting tightly on a number of would-be buyers, a few of whom are willing to bet they'll be fighting for flat-rolled products come January. Adjustment of steel income to finished goods outgo is still rigid.

A better criterion of raw steel inventory levels is the relation of inventory on hand to sales of finished goods. One consumer has boosted his in-plant steel inventory by 300 pct since June. He feels that even if the projected sales curve for his company's finished goods through January were off by 20 pct (thus far it's not) he'd still not have a burdensome amount of steel on hand. He was stripping inventory until July 1, now is ordering 60 days ahead, has boosted his operating inventory from a lean 30 days in July to a present 60 days and reports that currently his steel income only equals his finished goods outgo. On paper, the inventory tonnage looks high. In practice, he's happy to have it.

Expects Sheet Shortage

Nor are long lead times, the extending of orders further into the future, a reliable overbuying indicator. A large buyer of a wide product mix is currently reducing steel inventory. Yet he's buying steel on as much as 90 days lead time. He over-reduced inventories early last spring, began rebuilding in late first quarter. He now has a 60-day inventory that will shrink until Jan. 1, then begin to build up again. At that time he'll be buying more than he's consuming. Currently, he's buying less than he's consuming. His extended delivery dates merely guarantee first quarter rolling mill space.

"My get-home pay—that's what the little woman gripes about."

Expect CR Sheet Shortage

What about those who aren't sharing in the business pickup? Wouldn't they have inventory surplus? Not necessarily. A cold-rolled sheet consumer who has reduced his steel inventory by about two-thirds since June this year reports his consumption is off by 20 pct for the same period. But his purchasing rate is running beneath consumption, is 10 pct below his very low June buying rate. This purchasing agent drew attention to his graying hair, indicated that he expects to be battling a cold-rolled sheet shortage come January, but that management won't permit him to advance inventory stocks. He's buying on 90-day lead time, but in trickles.

Advances Buying Rate

Where inventories are advancing, they are not always scare buying. A purchaser who is boosting his permanent in-plant inventory by 10 pct to a 20-day operating inventory, suggests it is just that—a permanent increase. He had reason too. His books indicate 1954 sales equaling the record levels of 1953. A semi-finisher, he reports that in the past 30 days increasing numbers of his customers have been extending the lead time on their orders to 90 days. This included farm equipment, automotive accessory, and appliance producers. These customers, too, indicated that management is putting

the brakes on the man who does the actual buying.

A large consumer who completed an inventory correction of surplus raw steel on Nov. 1 promptly advanced his buying rate by 10 pct. Nonetheless, he's not buying more than he is using and his in-plant raw steel inventory is currently 25-30 pct below the June figure, though he has what he hopes is a 60-day operating inventory. His steel deliveries are extended into January, with galvanized sheet and enameling iron increasingly difficult to get.

Extend Ordering

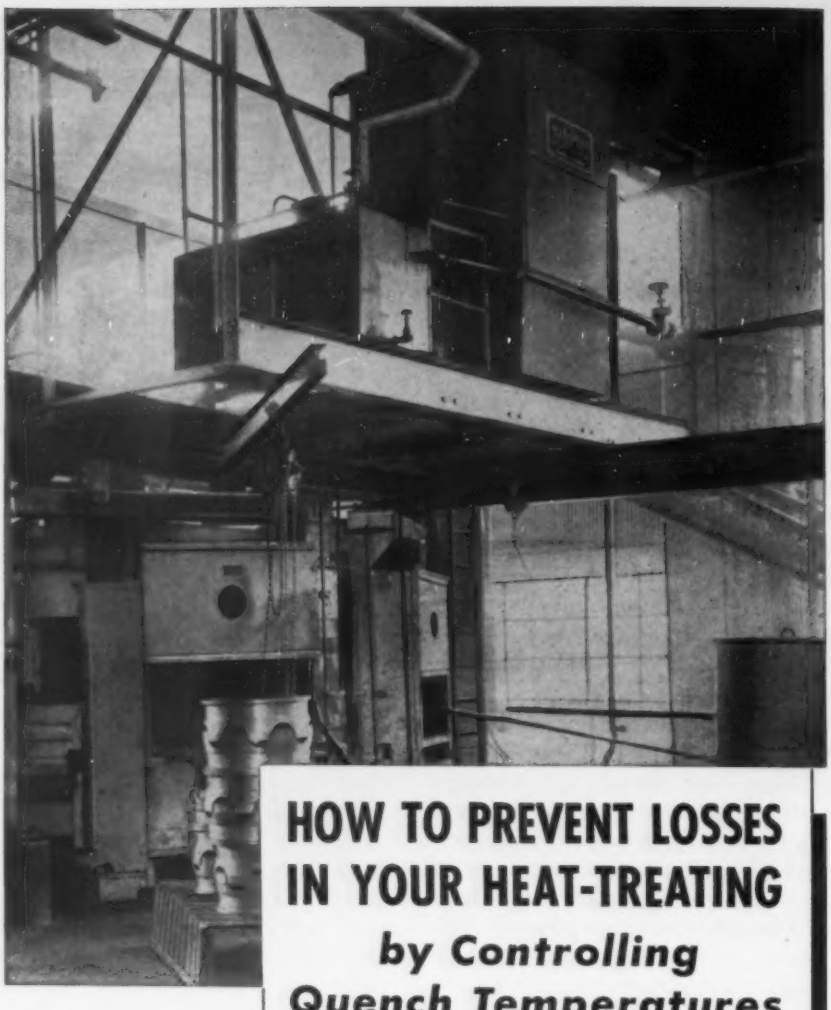
At least in the Midwest, there is some scare buying of cold-rolled sheet. A stamping shop that is expecting difficulty in getting steel for January admits it's buying more steel that it is using, but reports its in-plant inventory still 30 pct below the June level, and the stamper's own business is picking up. He's extending his ordering into January in the face of minimum 4-5 week delivery on cold-rolled 16-gage sheet. He's a small consumer, and is making sure he won't be caught short.

A plate consumer has reduced his in-plant stocks by 30 pct since June, is depending on 2- to 3-week plate delivery to maintain his 30-day operating inventory. He foresees no pinch in the grade, will depend on eastern mills if new line pipe orders tighten the first quarter plate supply. Like others, he'd like to buy more, has orders not to.

Policies Differ

No doubt about it. There are companies who are buying more steel than they are using, just as there are still companies with inventory surpluses. But the greater number are maintaining the tightest relationship betwen raw steel inventories and finished goods sales in the past 9 years. If sales fail, inventories shrink immediately. And there are still, in this period of rising steel mill activity, a handful of firms who are actually reducing inventory.

The inventory pendulum seems more to have stopped in mid-air than to have swung to overbuying.



HOW TO PREVENT LOSSES IN YOUR HEAT-TREATING
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● Using Niagara's AERO HEAT EXCHANGER to cool your quench bath never fails to give you real control of the temperatures at which you wish to quench.

Your experience will be the same as others who have installed this method. You'll get better physicals; save losses and rejections; increase heat-treating capacity and production with lower costs. You can put back heat into the quench bath to prevent the losses of a "warm-up" period. You remove heat at the rate of input and prevent flash fires in oil quench baths.

You'll save space in your heat treating department and get a more productive arrangement because less room is needed for coolers and tanks. You'll find savings in piping, pumping and in the amounts of oil you will have to buy. And the saving in the cost of cooling water alone is enough to repay the cost of the Niagara Aero Heat Exchanger, usually in less than two years.

Write for Bulletin 120 and further information

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ORE: Slow Lakes Season Ends Early

Called poorest season in 15 years . . . Total season shipments will be about 60.8 million gross tons . . . See boost in Labrador shipments when Seaway is completed . . . Describe new vessel—By T. M. Rohan.

◆ GREAT LAKES iron ore shippers wish their rate would pick up like the steel industry's. Last week they were rapidly finishing their poorest season in 15 years.

Of 275 ore carriers registered on the Great Lakes last year, only 222 or about 80 pct ever got away from the dock. By last week there were less than 80 still in service and these were rapidly winding up the season. A year ago they were running well into December.

And the 1955 outlook at present is not too optimistic. Ore piles at U. S. and Canadian mills are about 52 million tons. By the opening of the shipping season May 1, 1955, this will probably still amount to about 22 million tons—so there will be little pressure for spring shipments. Highest spring stock in recent history was 33 million in 1938 and lowest was 13.5 in 1947. This year it was 26.1 million tons.

Ship 60.8 Million Tons

Pittsburgh Steamship Div. of U. S. Steel, largest Lakes ore carrier, moved 18.5 millions tons this year compared to 27.5 million in 1953. This was done with 59 ships since five smaller ones were sold at the beginning of the year. This firm started with all 59, dropped 15 on Sept. 1, three during September and six during October. All ore shipping was completed by Nov. 9 while in 1953 they were still moving in December.

Overall Lake shipments in November were expected to total about 3 million tons and through October had hit 57.8 million tons. Early wind-up is indicated by comparison with 5.3 million tons shipped in November of last year.

Influence of Labrador ore in the Great Lakes picture this year has been minor although, of course, impact was considerably heavier along the Eastern Seaboard. St. Lawrence Seaway will give Labrador a highway to deliver ore to Great Lakes steel producers.

Launch New Ship

To the end of October 58,725 gross tons or about 20 cargoes from Labrador had been shipped through the Great Lakes. In addition some was shipped to Baltimore and hauled by rail to Cleveland, Toledo and Ashtabula. Some Liberian ore was also brought in to Baltimore, then sent by rail to Ashtabula or Cleveland and reloaded on ore carriers for shipment to Chicago. This special high grade ore can be sent at a lower rate this way than by rail from Baltimore to Chicago.

One of the few bright spots in the picture was addition of the *SS George M. Humphrey* christened late in the season at Lorain, O. It was named for the Secretary of the Treasury, former president of M. A. Hanna Co., Cleveland, in whose fleet it is operating. This ship, built by American Shipbuilding Co., has the largest capacity of any ore carrier on the Lakes.

By end of the season it will make 8 to 10 runs. On Oct. 21 it loaded a record cargo of 22,379 gross tons. Eventually, if sufficient draft is available in ports, it will probably haul up to 24,000 tons at a crack. Although three or four other ships in the Great Lakes fleet can exceed its speed by about 3 or 4 mph, they carry only about 14,000 tons.

Has New Features

The new ship is 5 ft wider than the two longest ships on the Lakes, the *SS Joseph Thompson* and *SS T. R. McLagan*, a Canadian vessel. Although a few feet shorter, its cargo capacity is greatest. It displaces 31,650 long tons, develops 8500 shaft hp and travels 16.5 mph loaded. Cost is probably in excess of $5 million.

New features not previously used in Lake bulk freighters include heavy use of welding in hull construction, special framing in forward end for more strength with less weight, extra long hatch openings for faster loading and unloading.

NEW duplex milling machine at Pittsburgh Works of Jones & Laughlin Steel Corp. finishes both edges of cold-rolled flats simultaneously.

GIFTS: Can Save Income, Death Taxes

Properly planned gifts to your heirs during your lifetime can yield substantial savings on income, inheritance taxes . . . But must be irrevocable, complete . . . Leave yourself enough to live on

◆ IF YOU REALLY want to save death taxes, and income taxes too, the one best way is to make gifts to your children during your lifetime. In fact, the tax advantages are so attractive that many people are tempted to give away more than they should. For those who can afford it, however, a conservative program of lifetime gifts can be an important part of an estate plan.

Charlie Doyle was president and sole stockholder of a manufacturing company worth $400,000; in addition he owned $200,000 worth of marketable securities and carried $100,000 of insurance. He was a widower with three grown children—a son who was working up in the family business, and two married daughters, to each of whom he gave $100 a month for personal luxuries their husbands could not afford.

Improved Cash Position

If Charlie had died worth $700,000 the tax would be $194,000. And because of his high income tax bracket it took monthly earnings of $526 to give the $200 to his daughters.

After making certain he would have enough to retire on comfortably, Charlie decided to give some of his property away. He gave $50,000 of income-producing securities to each of his daughters and his son $50,000 worth of stock in his business. This involved paying at the time a gift tax of $17,990. But by reducing his estate by $167,990 (the amount of the gift plus the tax), he would save $58,500 in death taxes—a net saving to the family of $40,610.

And Charlie actually had more spending money after the gift than he had before. The stock in his business paid no dividends, so there was no loss of income there. He did lose the income on the $100,000 worth of securities given to his daughters and on the money he used to pay the gift tax, but this loss of income was more than balanced by the discontinuance of their allowances and the income tax savings resulting from his reduced income. Here's how the figures lined up:

Annual spendable income saved by discontinuing daughters' allowances	$2,400	
Reduction of income taxes as result of gifts	$2,926	
Total Saved		$5,326
4 pct income lost in $100,000 of securities	$4,000	
4 pct income lost on approximately $18,000 used for gift tax	$720	
Total Lost		$4,720
Net increase in annual spendable income		$ 606

His daughters were better off too. Their husbands' earnings were considerably less than their father's and they had more exemptions. They were in an income tax bracket of 26 pct. Before the gifts they each received an allowance of $1200 a year free of taxes. After the gifts each daughter's income was $2000 a year or about $1500 after taxes.

Because gift taxes are lower than death taxes in large or medium size estates, you can generally save by giving away part of your estate before you die. As for income tax, any parent who pays an allowance to a child in a lower tax bracket can put both himself and the child in a better position by giving the child the property producing the income and letting the child pay the tax on it.

Actually Charlie could have accomplished even more savings: Instead of making the gifts to his children all in one year, he could have taken fuller advantage of the exclusion and exemptions allowed in the gift tax law and spread his gifts over a number of years. In this way he could have eliminated the gift tax altogether and still saved substantially on death and income taxes.

How It Works

Here, very briefly, is the way the gift tax works. Everyone is allowed to give away tax-free $3000 in each year to each beneficiary. You can give $3000 to your son, $3000 to your daughter, and $3000 to your sister each year and not even have to file a gift tax return. This is called the annual exclusion.

If a gift to any one beneficiary exceeds $3000 in any year, you have to file a gift tax return, but you won't necessarily have to pay a tax because in addition to the annual exclusion, each taxpayer is allowed a lifetime exemption of $30,000 for all gifts to all beneficiaries in excess of the annual exclusions made during his life.

After the exemption has been used up you begin paying gift tax on all gifts over the annual exclusion. This begins at 2.25 pct, goes

Gifts and Taxes

Gifts made to your children during your lifetime may well be the single best way to save both income and inheritance taxes. But it is important to consider all the pros and cons.

This article discusses the various aspects of lifetime giving. It is part six in a series THE IRON AGE is presenting on estate planning in cooperation with Provident Trust Co. of Philadelphia and John J. Buckley, Provident vice-president.

up to 27.75 pct and higher when your total gifts exceed $1 million.

For example, a man who has made no former gifts gives his son $33,000. He pays no tax because of the $3000 annual exclusion and the $30,000 exemption. But he has now used up his exemption and that is gone forever. Thus, if the next year he gives his daughter $4000, he must pay a gift tax on the $1000 over the $3000 annual exclusion.

The Marital Deduction

If you are married you can, with your wife's consent, treat a gift as if it were made half by yourself and half by your wife, even though it is all your money. This is permitted by the gift tax version of the "marital deduction." If your wife has made no gifts of her own, you can take advantage of both your own exclusions and exemption and your wife's, thus doubling the limit of tax-free gifts. You can make an initial gift to your child of $66,000 plus $6000 each year thereafter without incurring gift tax liability.

What about gifts from one spouse to the other? The same exclusion and exemption is allowed, doubled by reason of the marital deduction, but usually there is little or no tax advantage to making such a gift. Taxable income can be split between married couples anyway, so that there is no tax advantage.

Must Be Permanent

As for death taxes, in most cases because of the marital deduction they will be about the same after both spouses have died regardless of whether you give half your estate to your wife during your life or by will. The really dramatic savings arise when the gift is made to someone other than a spouse. For this reason the examples discussed all concerned gifts to children.

Gifts can be either outright or in trust. The annual exclusion is not allowed for gifts of future interests, but this makes no difference except in the case of small gifts in trust where the value of the life income is less than the allowable exclusion. Thus Charlie Doyle could have accomplished the same income and death tax savings if he had made his $150,000 gifts to trustees and had set up written trusts providing that each child would receive the income for life with principal passing to the grandchildren as each child died.

In short, the form of the gift is irrelevant with this important qualification: *It must be complete and irrevocable!* In other words, the gift must have no strings attached, and no control, benefits or possibility of benefits should be reserved by the donor.

Gifts of life insurance should now be particularly attractive in view of the liberalization of the law. Suppose you have a policy of $50,000 on your life and the beneficiary is your only child. If you transfer the ownership of this policy (right to change beneficiary, borrow on the policy, cash it in, etc.) to the child, the taxable gift will be, not the face amount of the policy which the child will eventually receive, but the value of the policy at the time of the gift.

Under the new law you can continue to pay premiums on this policy without adverse tax effect. Each subsequent premium will be considered as an additional gift to the child who now owns the policy, but the proceeds will not be considered part of your taxable estate when you die.

While lifetime gifts offer a broad and diverse field for possible tax savings, there are some jokers in the pack. We have said a lot about the pros of making gifts; what about the cons?

An immediate one is the danger of capital gains taxes. If you give your child property during your lifetime and he later sells it, his basis for capital gains tax will be what you paid for it or its value at the time of the gift *whichever is lower*. On the other hand, if you die owning the same property and leave it to your child by will, he will have as a new basis the value of the property at your death.

Thus, if you intend to give away property which has depreciated in value since you bought it, it is generally better to sell it, take the capital loss for income tax purposes, and give away the cash instead. Conversely, if the property is now worth much more than you paid for it, the tax picture will often be more favorable if you die leaving the gift in your will.

"Tell old bird-brain an ex-bookkeeper of his would like a few words with him."

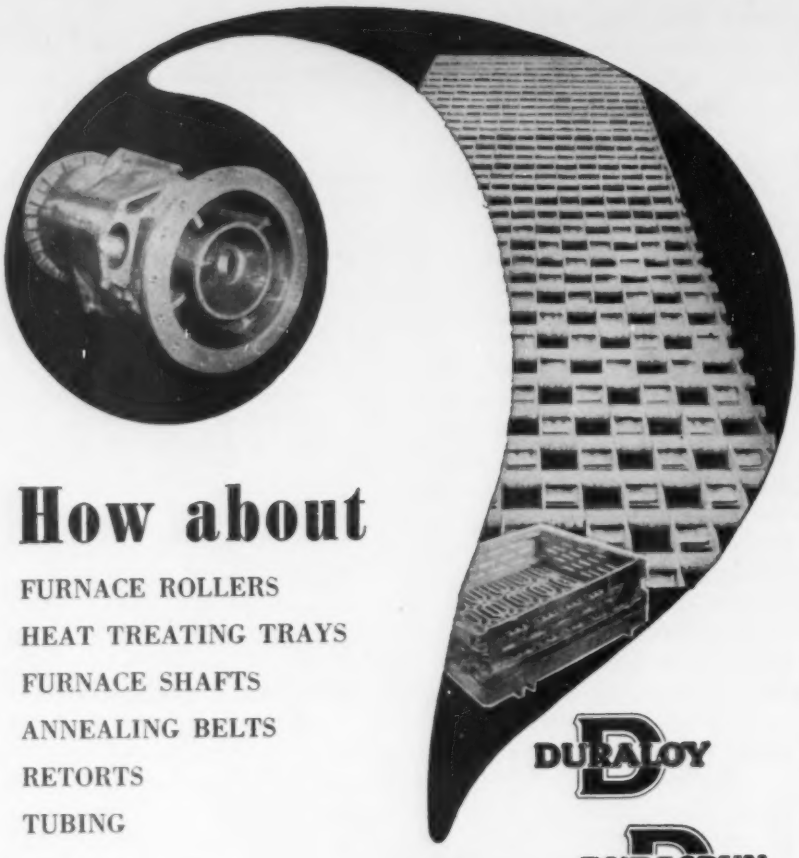
Don't Be Hasty

Main disadvantage of making any lifetime gift is that you no longer own what you have given away. This is not said in jest. To obtain the tax advantages of gifts the property must be put definitely and finally beyond your reach. It is too late to change your mind if you later find that due to your generosity and business reverses you and your wife must rely on your social security checks and the charity of your children. No tax saving is worth this risk.

Live 3 Years

It is important to remember this if you are tempted to make a gift of an interest in the business you started on a shoestring. It's all right to make such a gift to your son if he will continue the business after your death. But if your business is to be sold after your death, savings in income and death taxes from lifetime gifts of shares in the business may be less attractive because of capital gains tax.

Another possible joker is that property given away during your lifetime does not escape death taxes if it is found that the gift was "in contemplation of death." There is much law on this subject, but basically if you die within 3 years of the date of the gift, it is presumed that it was made in contemplation of death. And your executor will have a tough time proving it was not. On the other hand, if you survive the gift by 3 years or more, you have no worries.



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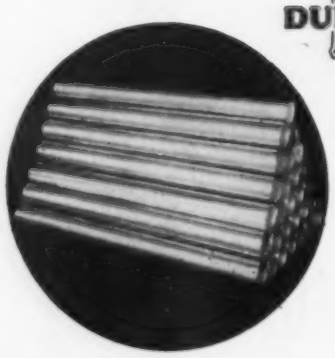

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Locomotives:

Still slumping, deliveries down . . . Freight cars better.

Locomotive manufacturers are still deep in a slump. For the first 10 months of this year, only 986 new locomotive units were placed in service by Class 1 railroads, compared with 1822 for the same period in 1953.

While delivery of new locomotives for the first 10 months declined about 50 pct, deliveries in October fell even lower, totaling only 33 compared with 156 for the same month a year ago, according to the Assn. of American Railroads.

Indication that the slump has not yet hit bottom is shown in figures for new units on order. As of Nov. 1, orders for only 158 new locomotives were outstanding, compared with 603 on the same date in 1953.

Most of the new units being delivered and ordered are diesel-type with about one out of every 15 ordered going for gas turbine-electric or electric.

Deliveries of new freight cars also continued to decline in October, but there were indications that the low point may have been reached as the backlog of unfilled orders for new cars rose slightly.

Placed in service last month were 1817 new freight cars, compared with 2566 in September and 8727 in October, 1953, according to the Association of American Railroads and the Railway Car Institute.

Orders for 2704 new cars were placed in October which brought the backlog of undelivered units to 12,853 on Nov. 1, compared with 11,993 a month earlier.

"Frankly, madam, can you show me another car at this price with a compression ratio of 8.5:1?"

MANAGEMENT: Wants Fingertip Facts

Lukens Steel management asks for faster market information . . . So commercial research department gives it facts at its fingertips . . . The new and simple system yields latest key data at a glance.

♦ COMPETITIVE selling demands more and more market information. That's why market or commercial research has become of vital importance to top management as well as the sales department.

And management wants its market facts in a hurry. Take the case of Lukens Steel Co. of Coatesville, Pa.

Want Facts Fast

A little over a year ago Lukens' Management Committee told the company's sales and marketing executives, "Communications must be speeded up . . . We need sensitive barometers of market facts and business outlook . . . They must be digested quickly and kept up to the minute . . . We need facts at our fingertips."

Commercial Research Dept. which was already collecting and developing much of the desired data, undertook development of a fingertip control method of presenting it.

But Commercial Research first reviewed the scope of its job, picking out the most vital highlights which should get emphasis for top management and sales.

Key data fell into five principal categories:

- **Outlook in major capital goods industries**
- **Performance of Lukens compared with steel industry as a whole**
- **Lukens' performance by product**
- **Performance by market**
- **Performance by geographic area**

Under each of these divisions were four to eight subdivisions. For example, under Outlook in Capital Goods it was deemed advisable to present outlook in iron and steel; heavy electrical equipment; special industrial machinery; construction, mining and oil field equipment; value of new construction, and Lukens' orders and shipments against total capital goods orders and shipments.

Performance by Lukens compared with steel industry as a whole, was broken down into a presentation of: (1) Shipments and new orders, (2) Shipments vs. estimated sales level, (3) Lukens' operating rate, (4) Lukens' participation in the steel plate market, both carbon and alloy and (5) Lukens' shipments vs. industry's shipments.

Use Quick, Easy Method

Product, market and area data were similarly broken down.

After deciding what to present, the next question was how to present it. It was decided the presentation should be visual in order to get across the most information in the shortest time. Graphs and bar charts were chosen as practical visual aids to use, and a "Market Facts" board was designed for mounting the 26 graphs and charts required.

Next question was how to prepare the charts and keep them up-to-date.

It was decided to adopt a relatively new method of preparing charts, graphs, layouts, flow sheets developed by Chart-Pak, Inc., Stamford, Conn. The new technique eliminates drafting and permits anyone to revise charts in but a fraction of the time required by other methods.

This speed and simplicity are important at Lukens. All charts on the "Market Facts" board can be brought up to date in a single afternoon.

The system works as follows: Titles, ordinates and abscissas are affixed to a Chart-Pak plastic

COMMERCIAL research at Lukens Steel brings 26 charts up to date in a single afternoon by means of a variety of pre-printed press-on tapes.

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board. This is done by typing, hand lettering or printing required information on self-adhering Chart-Pak forms or preprinted statistical rolls and simply pressing them to the board. This phase of the chart-making is done only once—when initially setting up the chart.

To put in a given line on a graph or chart, simply unroll the tape having the desired marking to the proper length, press it in place and cut it off. To bring the chart or graph up to date, press on a different length tape. Tapes can be removed and new graphs constructed without damaging the plastic board or basic chart.

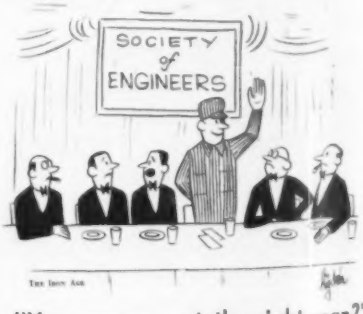
Because of the variety of lines, bars, and colors available, a number of factors can be plotted on a single board without making the data confusing.

Once the charts have been brought up to date, they are analyzed and their significance explained to various management groups at specially held meetings.

Business Flying Rising

Business planes owned by individuals or companies last year flew 430,000 hr more than all scheduled domestic and international airlines. Civil Aeronautics Administration discloses that business flying of individuals in private planes on business trips increased 16 pct over 1952, to reach 3.6 million hr.

Pleasure flying shows its first increase since 1949, totaling 1.8 million hr, a 22 pct increase. Instructional flying decreased 17 pct, commercial agricultural flying increased 8 pct and patrol, survey and other flights were up 11 pct. Passenger and cargo transportation for hire, including irregular scheduled flights, declined 18 pct below 1952.



"You sure we got the right man?"

STEEL: Ex-importers Roll Their Own

Survey shows international steel trade in gradual decline . . . Former colonies, have-not nations are developing own productive capacity . . . Schuman countries total 64.2 pct of free world exports, U. S. 17.5 pct.

♦ A SURVEY by British Iron & Steel Federation shows that world steel exports are recovering from the setback of 1953. But they seem unlikely to regain the pre-war peak of 19 million tons achieved in 1929, and in proportion to total production they are much lower than at that time.

World steel production last year amounted to 259 million tons, according to Federation figures. By contrast, world exports of finished and semi-finished steel totalled little more than 17 million tons, equivalent to roughly 22 million tons of ingots.

Reason for this relatively small export tonnage is, of course, that most steel is consumed at or relatively near the producing points. In the Free World, these are located in the northeastern U. S. and Northwest Europe. Here producing mills and consuming plants are in close proximity.

Small But Vital

But the international steel trade is more important than the comparison of totals would indicate. For countries that rely on imports, the trade is vital. And for the handful of steel producing countries, an active export business can mean the difference between prosperity and depression.

There are two broad streams of international steel trade. First, between principal steelmakers themselves. This trade consists largely of the sale of semifinished steel for further working, though some interchange of finished steel products, often specialties, also takes place.

Second—and more important in terms of tonnage—is export of finished steel from producers to consuming countries, some of which have steel capacity of their own.

The role of different countries in the international steel trade bears little relation to the size of their output. Schuman Plan countries were collectively responsible for nearly two-thirds of world exports last year—including a substantial amount of intertrading—but for only one-sixth of world production.

Belgium and Luxemburg combined generally account for over 25 pct of world steel trade, but produce only about 3 pct of total output. On the other hand, the U. S., with nearly half the world's steel-making potential, is normally responsible for less than 20 pct of the international trade tonnage.

Dependence on export business differs enormously from one country to the next. At one end of the scale is Luxemburg, which sells almost all of its production outside its own frontiers; at the other end is the U. S., where exports amount to only about 4 pct of the industry's output.

See Long-Term Decline

Over a long period the downtrend in exports is evident. In 1913, exports from the main producers represented nearly 25 pct of world production. By 1929 export had fallen below 20 pct. In 1938 it was just over 10 pct and by 1953 it was smaller still. For this relative decline there are two main reasons.

First, a downtrend has been visible for many years in exchanage of semifinished steel—ingots, billets, blooms, slabs and bars. In 1913, trade in semis amounted to something like 22 million tons and represented about 15 pct of total world trade in steel. Main exporters were Belgium and Germany, followed by the United States and France. After a big

Free World Steel Exporters (Based on 1953 Tonnages)

	Pct World Production	Pct World Exports	Pct Production Exported
Belgium-Luxemburg	3.1	27.5	80
France & Saar	5.4	22.3	37
W. Germany	7.5	11.6	14
Italy & Netherlands	1.9	2.8	14
Total E. C. C. S.	17.9	64.2	32
U. S. A.	43.2	17.5	4
United Kingdom	7.6	13.1	15
Japan	3.3	5.1	14

dip during the '20's the tonnage recovered to about 1.7 million tons in 1929, though in that year trade in finished steel was about half the 1913 tonnage.

At its 1937 peak, tonnage of semis exported was under 1.3 million, less than 10 pct of total output, while the 1953 figure was little more than a million tons. Explanation is the general tendency in steelmaking countries to balance up producing facilities.

Exporters of semis are extending their mill capacity to use up the surplus, while the importers (including Britain) are increasing their capacity at the earlier stages.

Second, trade in finished steel is being affected by the growth of steelmaking facilities in the importing countries. Two world wars and their aftermath have made some former importers reluctant to rely on overseas suppliers.

Some of these have necessary coal and ore for efficient steel industries of their own.

Political Factors Important

In other cases, political and strategic factors have played a larger part in decisions to build steelworks than have economic considerations. Whatever the reason, the past 30 years have witnessed a considerable expansion of capacity outside the main producing areas.

Canada, Australia, India, Pakistan, and South Africa, which last year imported 500,000 tons of finished steel from Britain, are all planning to increase their home capacity during the next few years. Their combined output of steel, which has already risen from over 6 million tons in 1948 to almost 9 million in 1953, seems likely to reach 12 million tons within a 5-year period.

Same trend is taking place among Latin American producers —Brazil, Mexico, Argentina, and Chile. Their aggregate output may well be over a million tons higher in five years than it was last year.

DEFENSE

MOBILIZATION: Nearing Goals

Congress reports productive capacity nearly complete . . . Of 75 stockpile goals, 30 are reached, only 19 are less than half filled . . . Selenium most critical item.

◆ GOVERNMENT'S mobilization program, including stepped up production capacities, stockpiles and emergency controls, is "a long way toward achievement," a joint Congressional committee reports.

The Senate-House Committee on Defense production says in its fourth annual report that large-scale expansion of privately financed defense capacity is nearly completed and minimum goals in strategic materials stockpiling have been reached in a number of areas. But the report warns against permitting the industrial complexion to "slip below maximum readiness for any emergency."

Deliveries Higher

Since Korea, the report summarizes, more than $155 billion has been appropriated for military procurement and construction, with about $92.9 billion worth delivered through last June 30.

Delivery of guided missiles during last year increased 104 pct; ammunition 23 pct; ships 6 pct; electronics 6 pct and aircraft 5 pct. Decreases caused by shifts in emphasis are reported in tanks, automotive equipment, textiles and clothing, construction, and weapons. Estimated deliveries in the next 12 months are $21.7 billion.

As examples of the large-scale expansion which have increased this country's capacity to produce for "war and peace," the committee cited steel production capacity, increased from 100 million tons in 1950 to 124 million tons; aluminum capacity doubled in the last three years; electric power capacity increased by 35 million kilowatts and large increases in oil refining and gasoline capacity.

Private industry stepped up its rate of plant and equipment expenditures to nearly $28 billion in 1953, compared with $19 billion in pre-Korea years.

Through last September, the report adds, some $18 billion of new defense production facilities have been granted fast tax amortization certificates, which has been a powerful force in boosting defense capacity.

Selenium Most Critical

Of 75 goals for stockpile of strategic materials with a value of $6.8 billion, some 30 have been reached and only 19 are less than 50 pct complete.

While most of the scarce materials of a year ago are now in free supply, the committee says, ferroalloys remain on the "critical" list, and nickel, tantalum, selenium, titanium and strategic mica are listed as the scarcest materials.

NEW VOODOO long range fighter may be equipped with atomic weapons.

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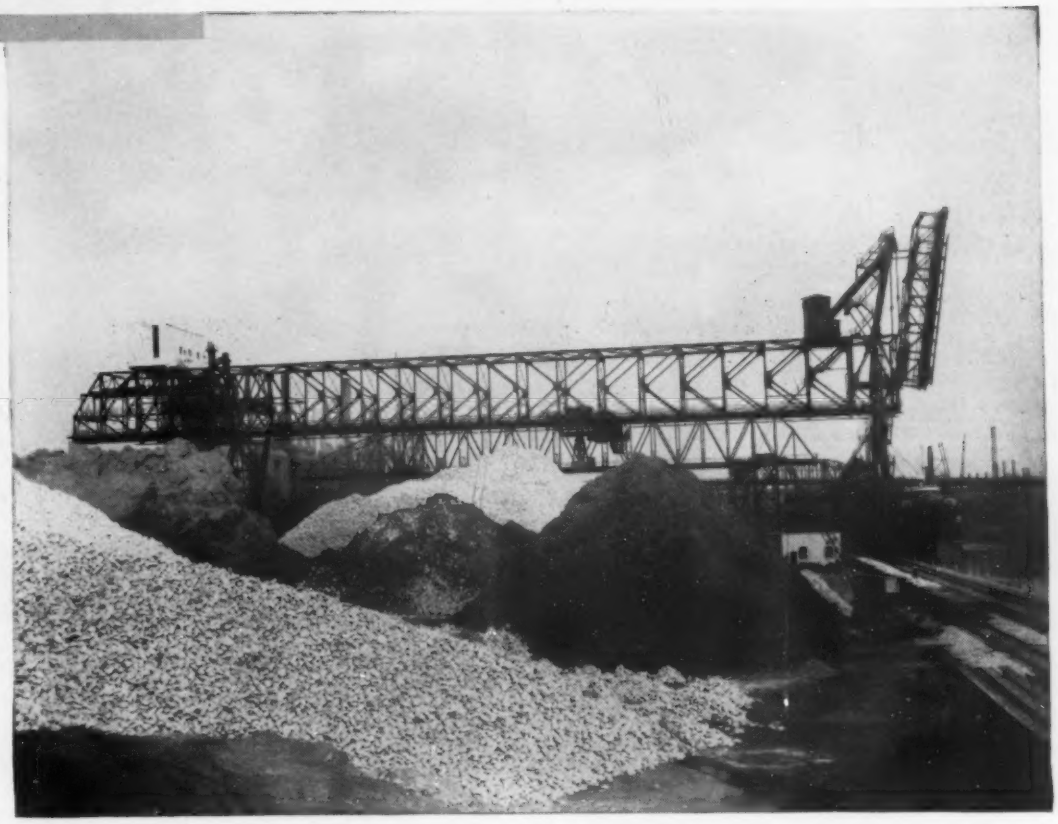
Locomotive Cranes
Power Cylinders

Wellman ore bridges

New 577 foot span speeds handling of ore



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Report To Management

If you're a steel buyer you're probably kicking yourself for letting your inventories drop so low this summer. Now you're in a rat-race to get the steel you want when you want it. And there's no prospect the situation will ease soon.

It's the same old story of steel users over-correcting their inventories. Through the first three-quarters of 1953 steel consumers were afraid they wouldn't get enough steel so they built up inventories to unrealistically high levels. Then they suddenly saw the production indexes were moving down, heard we were in a recession, stopped buying and started living off the shelf.

Then came the fall pickup and manufacturers discovered they didn't have enough steel to cover production needs. This is what touched off the current steel buying scramble. It shows once again that steel buyers made the mistake of basing their purchasing policy on the business outlook as it existed at the moment rather than anticipating what it would be several months in the future.

But there's no reason for panic. Current steel capacity is enough to more than take care of domestic needs for the next several years at least, though there will be periods when extended delivery schedules will cause some headaches.

You can figure pressure on steel will grow between now and the end of the year and will extend into early '55. There may be some slackening in orders near the middle or end of the first quarter but then a new buying surge will develop as consumers start hedging against a possible price hike or strike as steel wage negotiation time nears.

And you can figure on another steel price rise in '55. The steel companies will try to hold the line on both wages and prices, but if United Steelworkers boss Dave McDonald forces their hand, as he is certain to do, this is what will happen: Steelworkers will get about an 8¢ per hour wage increase which will be accompanied by a steel price increase averaging $3 or $4 per ton.

Also keep your eye on copper—pressure for a price hike is growing. Reason: producer stocks in this country are at an all-time low and U. S. production isn't enough to meet domestic needs.

This means we'll have to step up our imports of Chilean copper considerably and current price of copper outside the U. S. is running several cents per lb higher than it is in this country.

Adding to the pressure for a copper price increase is the fact that the major copper consumers (electrical, electronic, automotive, construction industries) are all due for a big year in '55.

Survey of November business conditions by National Assn. of Purchasing Agents shows most of the buyers reporting a continuation of a moderate business improvement, with new orders outrunning increased production by a small margin. Price stability is more marked than ever and employment is up or holding gains that were made previously.

Encouragement on the '55 business outlook is given by the fact that 40 pct of purchasing agents expect their firms' capital expenditures next year will be greater than they were this year. Thirty-five pct believe outlays will be less, while 25 pct expect them to be at the same level.

Purchasing agents agree that inventories of industrial purchased materials have reached bottom. Nineteen pct, highest number for the year, reported moderate stock additions during November, while 26 pct, lowest number for the year, said they were still making inventory cutbacks.

INDUSTRIAL BRIEFS

Purchased . . . Aluminum Co. of America has purchased a lot in Kansas City on which a new sales office building for its subsidiary, Aluminum Cooking Utensil Co., Inc., will be built.

To Be Built . . . Allis-Chalmers Mfg. Co. will build what is said to be the largest steam turbine-generator in the world for the River Rouge plant of Detroit Edison Co.

Elected . . . Automobile Manufacturers Assn., Detroit, elected George Romney as a member of the board of directors. Mr. Romney is president and chairman of the board of American Motors Corp.

Ground Broken . . . Pacific Tube Co., Los Angeles, broke ground for a major expansion of its stainless steel tube pickling facilities on Nov. 1.

Receives Award . . . Chain Belt Ordnance Div. was named winner of the Metal Section Safety Contest by National Safety Council for achieving a zero "lost-time" accident frequency during ¾ million manhours of work.

Acquired . . . Republic Steel Corp. has acquired the coal mining properties of Ford Colleries Co., near Pittsburgh.

Announces Appointment . . . Turbine Equipment Co., Glens Falls, N. Y., has been appointed as representatives for the Cochrane Corp. of Philadelphia.

Merger Announced . . . Goodall Rubber Co., and its subsidiary, Whitehead Bros. Rubber Co., Trenton, N. J., authorized the merger of the two companies. Effective Jan. 1, Whitehead Bros. Rubber Co. will be identified as the Whitehead Rubber Div. of Goodall Rubber Co.

New Contract . . . Continental Foundry & Machine Co. will build and machine a substantial number of hulls and machine turrets for Army tanks as part of the $160,000,000 armor contract awarded Chrysler Corp.

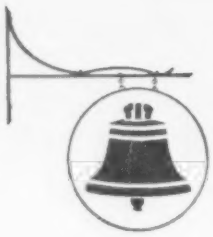
Will Continue . . . Machinery Div., Dravo Corp., Pittsburgh, will continue as national distributor for certain products of the Tri-Lok Co. which was recently purchased by Blaw-Knox Co.

Opened . . . National Supply Co., Ltd., has opened an oil well supply store at Drayton Valley, Alberta, Canada, to serve drillers and producers in the area.

Re-Located . . . Pratt & Whitney, Div. of Niles-Bement-Pond Co., has relocated its New York office to 42-19 Main St., Flushing.

New Site . . . Norton Co., Worcester, Mass., has acquired a 100-acre site on Hobbs Island, near Huntsville, Ala., and ground will be broken in December for two electric furnace buildings, a research building, and an office and utility building.

Special Committee . . . American Welding & Mfg. Co., Warren, Ohio, has formed a special customers' service and quality committee which will be known as the New Sections Committee.



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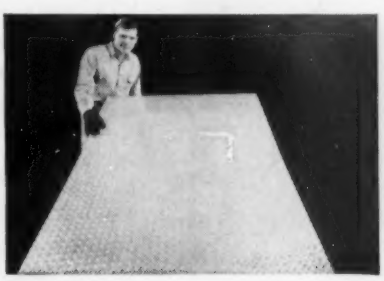
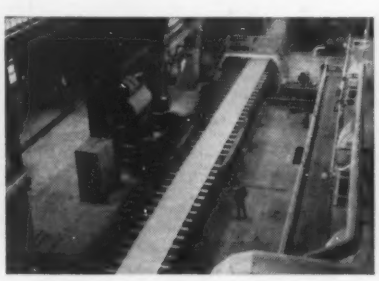
For more information on magnesium, call the nearest Dow sales office or write direct to the Magnesium Sales Department of THE DOW CHEMICAL COMPANY, Midland, Michigan.

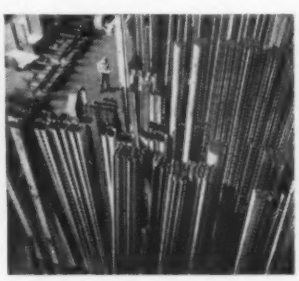
Lightweight, low cost magnesium tooling plate for more practical jigs and fixtures.



Light, safe, strong, low cost magnesium tread plate in the famous Inland 4-WAY design.



World's first 84-inch magnesium coil mill now rolls sheet and plate to greater lengths and widths.



Lightweight magnesium extrusions are available in many different sizes and shapes.

you can depend on DOW MAGNESIUM

DOW

AUTOMOTIVE ASSEMBLY LINE

GM: Another 50 Million Cars By 1970

President Curtice sees GM matching production of last 46 years in next 15 . . . Predicts 5.8 million passenger units for industry in 1955 . . . Sees auto sales pattern unsuited to guaranteed wage—By *R. D. Raddant.*

◆ THE RULE that there is safety in numbers can easily be applied to the press conference format. With dozens of eager reporters, each with his own angle to probe, a full line of questioning can seldom be followed to significant depth on any one subject.

This was illustrated last week when Harlow H. Curtice, General Motors president, faced the press on the occasion of GM's 50 millionth car. Through no fault of the cooperative president, the result was a scattering, rather than a few deep penetrating shots.

Sees Sales Up 10 Pct . . . But in general, Mr. Curtice's optimism prevailed as the significant note. He predicted a domestic market of 5,800,000 passenger cars for 1955, a 10 pct increase over 1954. This he based on consumer confidence backed up by an increase in consumer income.

"The people who were trying to talk us into a depression this year may not have the same reason for doing so in 1955," he said wryly.

He predicted that General Motors would turn out its next 50 million cars in less than 15 years, a rate of better than 3,300,000 cars a year, substantially over GM's present output.

Disclose Labor Strategy . . . Only the issue of the guaranteed annual wage was ducked, but a sidelight on GM's bargaining strategy was disclosed in the sidestepping.

"It has never been the practice of GM to negotiate new contracts publicly," he said. "I hope that negotiations this year can be conducted similar to the past."

He implied that the weakness of making statements in advance of negotiations puts one group at a disadvantage of having to maintain an inflexible position.

"They aren't as flexible as we are," he said, referring to the United Automobile Workers' full scale advance announcement of demands that will be made when contracts with the auto industry run out.

Can't Balance Demand . . . He also indicated that the uneven seasonal demand for cars is a factor that management ingenuity, as suggested by Walter Reuther, UAW president, is not able to solve.

"The customer is god and will determine when the cars are bought. A larger percentage of cars are constructed in the first six months of the year than the last six months. It has a relationship with the sun and I believe it will continue to be so," he explained.

ITALY's Umberto Maglioli, center, accepts congratulations, after winning the 1908-mile Pan American Road Race in a Ferrari sports car.

Other questions disclosed these sidelights of GM plans and Mr. Curtice's own beliefs and predictions:

Corvette Continued . . . Chevrolet's Corvette program will be continued with a new plastic body model introduced in 1955. But this will not be the station wagon type, as has been widely predicted.

GM approves legislation to curb bootlegging, but would have preferred a contractual relationship with the dealer. This, however, was turned down by the Dept. of Justice.

Mr. Curtice is "greatly pleased" with President Eisenhower's interest in the highway program, predicts the program will go through, and feels that the government expenditure of funds for the program is not out of line compared with industry's own capital expenditures.

Less Defense Business . . . GM's defense business in 1955 will "decline importantly," largely because its programs are completed and defense production from GM stockpiled.

He recalled that GM had been accused of being a favored supplier of defense contracts, as contrasted with the diminishing amount of government work lined up for 1955.

"They said we were given the business," he recalled. "I say we

Automotive Production

(U. S. and Canada Combined)

WEEK ENDING	CARS	TRUCKS
Nov. 27, 1954.....	116,142*	18,961*
Nov. 20, 1954.....	137,325	22,772
Nov. 28, 1953.....	56,127	18,163
Nov. 21, 1953.....	83,326	25,403

*Estimated. Source: *Ward's Reports*

were given the business, but in another sense."

GM will not relax its sales effort despite its present penetration of more than 50 pct of the market. Asked if there was any aim to end up the year below 50 pct, he replied with an emphatic "No Sir!"

Gasolines:

New high-compression engines demand 95 or more octanes.

A few skeptical eyebrows have been raised with the announcement of compression ratios that new auto engines will have. Cadillac and Buick engines both have a 9:1 ratio while 8.5:1 ratios are common throughout much of the industry.

The question has been raised frequently that these high ratios will require higher octane gasoline than the petroleum industry can supply.

However, automakers have been assured that 95 octane, satisfactory for a 9:1 ratio, will be available. The petroleum industry is investing record amounts in increasing the octane number of premium gas. This is not only to satisfy the present high compression requirements, but to meet those that will be demanded in the future.

High Octane Available

J. M. Roche, Cadillac sales manager, said he is confident that 95 octane gas will be available almost everywhere for his 1955 cars. National average for premium gas is now about 93.5, but 1½ points are expected to be added by the petroleum industry's new high-quality fuel capacity.

Pressure on the petroleum industry to boost octane numbers has been terrific and will continue to be. Auto engineers are now faced with the problem of getting increased performance from engines with limited opportunity for increasing displacement. Higher compression ratios, demand for higher octane are the inevitable results.

Sales:

See public's approval of Chrysler's 1955 models.

It is too early to pass full judgment, but evidence indicates that Chrysler's "Forward Look," 1955 styling is having success in the salesrooms.

With production of 1955 models over the 100,000 mark, Chrysler has increased its fourth-quarter output to about 280,000 passenger cars, an increase of more than 10 pct over the original fourth quarter target.

"Dealer orders for Plymouth, Dodge, DeSoto, Chrysler and Imperial passenger cars total more than 350,000," declared C. L. Jacobson, head of the corporation's sales staff.

Others Report Success

Elsewhere in the industry, Big Three salesmen report excellent sales results, as does Studebaker. Packard, Nash and Hudson 1955 lines are not yet out (with the exception of new Nash Ramblers).

A good start for Chrysler's divisions was all important. The 1954 sales slump placed Chrysler in a serious position and the success of 1955 lines was almost a "make or break" proposition. Lost stature is most difficult to regain and 1955 lines have that responsibility.

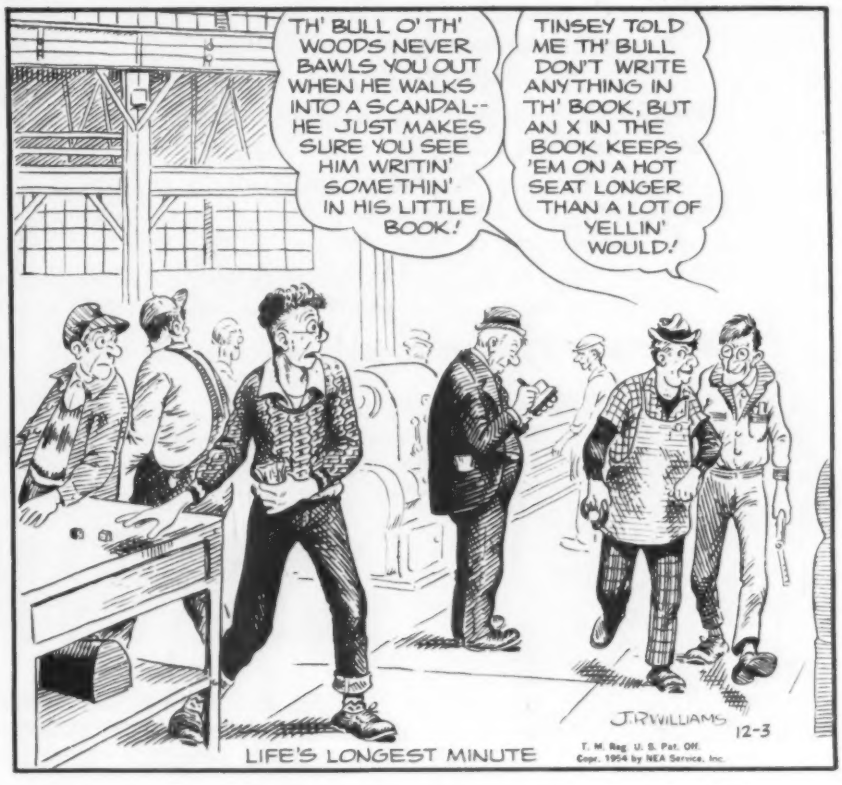
Use More Electricity

An important sidelight on automation is the demand that its use of mechanical handling makes on the power producing utilities.

T. H. Keating, Chevrolet general manager, points this out significantly in describing Chevrolet's new spring and bumper plant, which he calls an outstanding example of his division's program of "segmented automation."

In 1950 Chevrolet's consumption of electrical energy was 7.4 electrical horsepower per employee. At the new plant at Livonia, consumption of energy is 15 electrical hp per employee.

THE BULL OF THE WOODS — **By J. R. Williams**


TH' BULL O' TH' WOODS NEVER BAWLS YOU OUT WHEN HE WALKS INTO A SCANDAL--HE JUST MAKES SURE YOU SEE HIM WRITIN' SOMETHIN' IN HIS LITTLE BOOK!
TINSEY TOLD ME TH' BULL DON'T WRITE ANYTHING IN TH' BOOK, BUT AN X IN THE BOOK KEEPS 'EM ON A HOT SEAT LONGER THAN A LOT OF YELLIN' WOULD!
J.R.WILLIAMS 12-3
LIFE'S LONGEST MINUTE
T. M. Reg. U. S. Pat. Off. Copr. 1954 by NEA Service, Inc.

Everyone is talking about the NEW CINCINNATI TOOLMASTER MILLING MACHINE

CINCINNATI

Style 1B Toolmaster Milling Machine. Equipped with 1 hp spindle head; collet chuck type spindle nose, capacity 1/8" to 1" shank cutters; power feed to quill; worm positioning of swivel head.

Style 1B Toolmaster Milling Machine. Cincinnati rectangular overarm, square gibbed saddle-knee bearing, extra wide knee bearing on column face . . . these and other features constitute exceptionally sturdy construction for maximum hp cuts.

Meet the newest member of Cincinnati Milling's extensive line of machine tools . . . the Toolmaster. There are three styles of these sturdy toolroom milling machines:

1A—Manual feed to quill
1B—Power feed to quill
1C—Heavy duty spindle head

Toolmaster Milling Machines constitute a new opportunity to reduce costs in shops of all sizes; in toolrooms, metal pattern shops, contract machine shops, tool and die shops. You can depend upon any machine tool bearing the name plate of The Cincinnati Milling Machine Co. Would you like to know more about this new Toolmaster? Write for new four-color catalog, No. M-1870.

THE CINCINNATI MILLING MACHINE CO., CINCINNATI 9, OHIO

Style 1C Toolmaster Milling Machine. Equipped with 2 hp heavy duty spindle head; built-in motor; 8 spindle speeds; No. 40 standard spindle nose.

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MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

Air Force Plans 80-Ton Transports

Huge planes herald factory-to-battle-zone delivery . . . Ground defense against air attack becomes more difficult . . . Government may help ailing coal industry . . . Wont aim anti-trust at labor—By G. H. Baker.

♦ DISCLOSURE that the Air Force has plans for a giant turboprop transport plane capable of transoceanic flights with a payload of 80 tons may have heralded the day of factory-to-battle-zone delivery of military supplies.

Air Force Secretary Harold Talbott said aircraft which can carry 80 tons and span the Atlantic in 10 hr would make it possible to send war materials to the users immediately after manufacture.

When such a transport may be ready for testing is still a matter of conjecture. Officially, U. S. Air Force headquarters says only that no plane of the type and size discussed by Mr. Talbott is in production now.

(Biggest USAF transport in operation at present is the C-124, with a bulk payload of 32 tons.)

The civilian chief of the Air Force also described recently the problems of ground defense of target areas in this country. Bombers, he said, now release ordinary A-bombs 10 miles from the target.

Guided bombs controlled by electronics might be launched successfully 150 miles from a city or industrial plant under attack, he suggests, thus complicating the job of the defender.

May Help Coal . . . The U. S. coal industry is now officially rated as vital to the nation's mobilization base. This means that Washington is underwriting a limited degree of economic security for the industry, and is promising to block the grave deterioration which threatens a large portion of the industry.

Assurance to this effect has been given the coal operators by Mobilization Director Arthur S. Flemming. The Federal Government intends to keep production propped up in the months ahead so that the industry will continue to be an essential part of the master mobilization plan.

Mr. Flemming has disclosed to coal industry leaders that the White House soon (probably early next year) will present firm recommendations to the Congress for strengthening the faltering coal industry. He did not define the scope nor the direction these recommendations will take.

One type of assistance that the White House could recommend would be bigger exports of U. S. coal to non-Communist countries. Foreign Operations Administration plans to ship about 10 million tons of coal between now and July 1 to Spain, Greece, Yugoslavia, and Korea.

Report on Monopoly . . . Whatever else the Justice Dept.'s upcoming report on monopoly trends may recommend, it will not advocate that labor unions be made subject to federal antitrust laws.

THE IRON AGE

Proposals to make unions subject to the Sherman Antitrust Act have been made periodically in Congress, and it is reported that there is strong sentiment for such a move within the Department of Commerce. But such a plan is a nightmare to union leaders and neither the Republican nor the Democrat sides of the aisles at the Capitol have any intention of voting for any plan that might be tagged with a union-busting label.

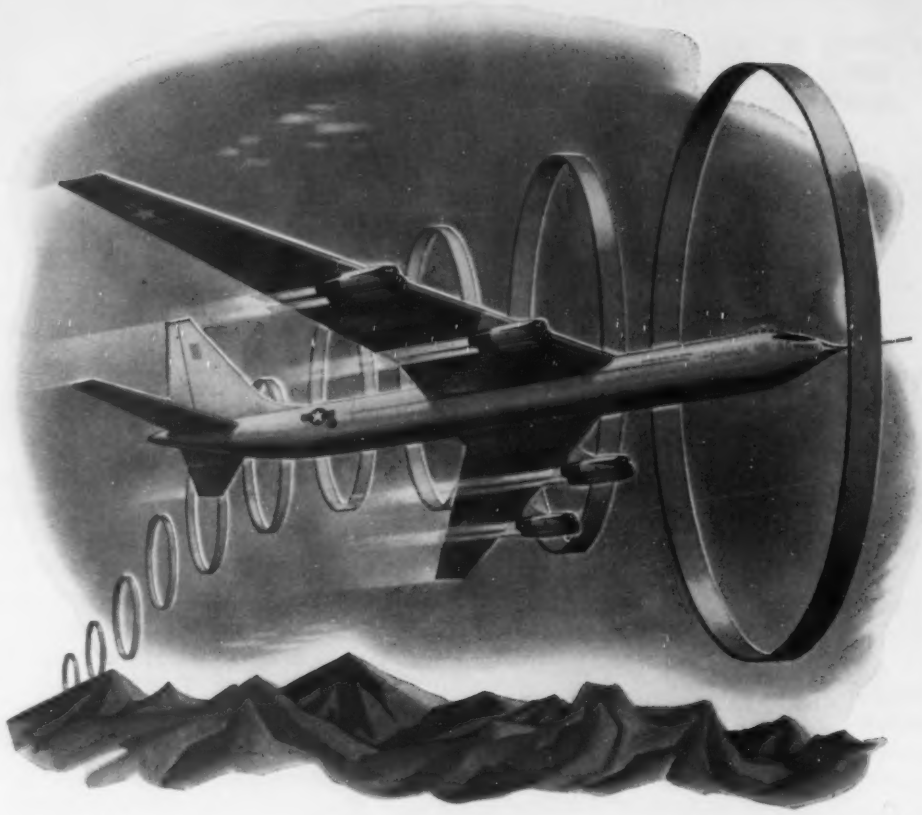
Attorney General Brownell is expected to concern himself in the new report with such issues as fair trade, corporate mergers.

Firing Communists . . . General Electric Co. defends its right to fire workers who won't answer official questions about Communism.

In a deposition presented to the U. S. District Court for the District of Columbia, GE president Ralph J. Cordiner makes it clear that the company reserves the right to fire workers who act against the firm's best interests.

Mr. Cordiner says he sees no need to discuss this company policy with the United Electric Machine and Radio Workers' Union, which is contesting the firing of employees who refuse to answer questions about Communist affiliations.

Employment Brightens . . . Hiring conditions will continue good in major production centers through the end of the year, latest



73 American Welded parts

IN EVERY J-57 JET ENGINE

For 35 years American Welding know-how has kept pace with the aviation progress. Today a large part of our extensive welding, machining and fabricating facilities are devoted to the production of welded components for U. S. jet engine manufacturers — 73 different kinds of parts on the Pratt & Whitney Aircraft J-57 turbojet alone.

This knowledge of welding and fabricating has also been applied to other industries. For example, if you produce a component like those shown here — or if you think fabrication by welding may be the solution to a particular problem —let us know. Our Product Development Division has been able to assist many companies with their metal fabricating problems and will be glad to consult with you.

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Tire Bases
Steel bands formed and flash butt-welded into wheel tire base for industrial trucks.

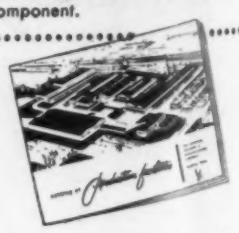
Wheel and Rim Assemblies
Weldment of carbon steel bar and plate for use on heavy earth-moving equipment.

Motor Frames
Steel bars and plate formed and welded into industrial motor frame.

Compressor Cases
Welded band for hermetically sealed refrigerator compressor.

Armature Spiders
Weldment of six parts combining plate and bar stock.

Turbine Frame Assemblies
Formed sheet metal bands and flash butt-welded rings fabricated into a jet engine component.



Send for Free Catalog of American Welding Facilities

U. S. Labor Dept. reports indicate.

Increased demand for workers in steel, metal products, and electrical machinery plants are already noted. Auto manufacturers have begun sizable callbacks of furloughed employees to handle production of 1955 models.

Slight to moderate hiring gains are in prospect in aircraft, farm machinery, and textile manufacturing fields.

Principal impetus is given to the employment advance by pre-holiday hiring in trade and service stores. Many of those hired for sales work, however, are not drawn from the normal labor pool, but from such groups as housewives and students.

In general, the unemployment downtrend is better than seasonal. About 100 major labor market areas show declines in demand for jobless insurance. In Detroit and Cincinnati, for example, insured unemployment drops amount to 20 pct or more.

Financing:

Corporate security offerings ahead of previous year.

Corporations offered $2.7 billion in new securities during the third quarter of this year, bringing the 9-month total to $7 billion, $600 million more than in the same period of 1953.

The larger volumes of flotations this year reflect a substantial increase in refinancing activity and a response to lower interest rates, Securities and Exchange Commission says. Refinancing issues amounted to $1.2 billion for the 9 months, compared with only $200 million for the same period last year. Amounts of securities offered have been rising in each quarter through the year.

Of the total, some $4.3 billion was obtained for new plant and equipment, a rise of about 100 pct over the previous year. The $1.1 billion of new money for working capital was less than a year earlier because of lower demand for credit from sales finance companies, the Commission says.

Forty-two pct of the total issues ($2.9 billion) were offered by electric, gas and water firms; manufacturing companies issued 25 pct ($1.7 billion), and mining firms issued $366 million. Publicly-offered issues for the nine months amounted to $4.4 billion of the $7 billion total.

Tankers:

Cities Service to trade in and build new ships.

Cities Service Oil Co. is the first firm to sign a contract with the Maritime Administration under the "trade-in-and-build" program of modernizing the merchant tanker fleet.

Cities Service will trade in five old tankers to the government for $4.8 million, and build two new super tankers at Bethlehem Steel Co.'s Sparrow's Point shipyard at a cost of $8 million.

Later in the spring, the firm will trade in two other older tankers and build a third new one. Officials estimate the three new tankers, compartmented to permit them to carry as many as 18 different types of liquid fuel in one load, will be able to carry as much in a year as did the seven tankers being turned in for mothballing.

Maritime Commission is also studying bids from seven firms for construction of three bulk oil tankers for the government. Sun Shipbuilding & Drydock Co., Chester, Pa., was the apparent low bidder, offering to build the ships for about $6.5 million each. Two Bethlehem yards submitted identical bids and were apparently second low bidders.

Ingalls Shipbuilding Corp., Pascagoula, Miss., is awarded a contract to build a fourth tanker for $8 million. The law setting up a $30 million fund to construct tankers for the Navy's military sea transportation service provides that a maximum of three ships may be built in any one year.

Investors:

Boost foreign investment $10 billion since war.

American investors increased their equity in the book value of direct foreign investments by about $10 billion from the end of World War II through the middle of this year, recent survey of the U. S. Commerce Dept.'s Office of Business Economics shows.

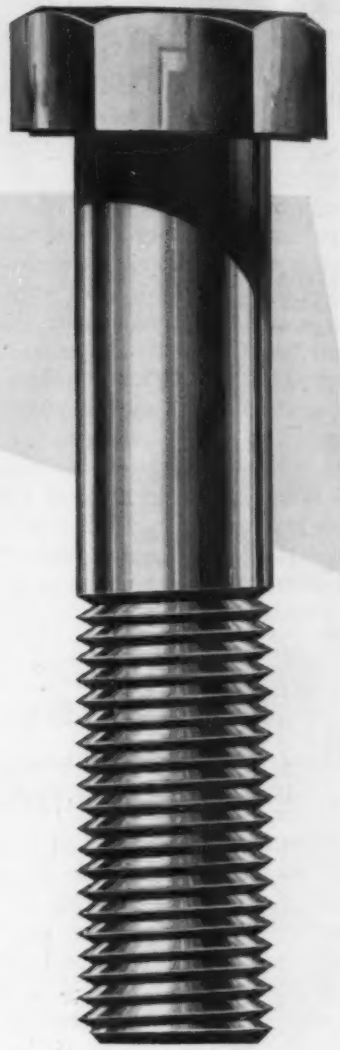
Direct-investment additions for the 8 years averaged $1.2 billion a year, evenly divided between the flow of capital from the U. S. and the investment of earnings from foreign operations. In the last 3 years annual new investment averaged about $1.5 billion. Portfolio investment during the postwar period was relatively small, amounting to only about $130 million—a shift in a trend after the first World War.

Earnings of direct investments in recent years have been about $2.2 billion annually, with about $800 million retained abroad for expansion and the remaining $1.5 billion, together with $300 million in fees and royalties, becoming important sources of income of many American companies.

Income taxes on American investments, aside from export and import duties, royalties and other taxes, have amounted to about $1 billion a year. Increased foreign taxes and weaknesses in some world markets and in shipping operations have offset the rise in earnings from new direct investment facilities brought into operation.

Largest increase in postwar foreign investments was made by the petroleum industry.

Which is the CleCap?



...the unusually LARGE one that's hard to find

One of the advantages CleCap customers enjoy is the knowledge that when they want some of those BIG cap screws, the chances are 9 out of 10 we can ship them the same day.

CleCap makes 'em regularly from ¼" to 2½" diameters, any length you want—ferrous and non-ferrous—and we stock a lot of unusual sizes, nearly 10,000 different items last count.

That's another reason for dealing with *The* cap screw specialists of the country. You also get unbeatable top-quality fasteners . . . PLUS a CleCap crew that has a long-made rep for "busting a leg" to get you what you want exactly when you want it.

What happens to your profits when late deliveries hold up production lines? Put your cap screw needs up to CleCap . . . and relax!

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Ferrous and Non-Ferrous: Bright, High Carbon and Alloy Steel Heat Treated, Brass, Silicon Bronze, Stainless Steel

Hex Head Cap Screws: ¼" to 2½" dia.
Socket Head Cap and Set Screws—Plain and Knurled: ¼" to 1½" dia. Also Flat and Button Head Styles.
Flat Head Cap Screws: ¼" to 1" dia.
Fillister Head: ¼" to 1¼" dia.
Set Screws—Square Head: ¼" to 1½" dia.
Milled Studs: ¼" to 1¼" dia.
Place Bolts: ¼" to 1¼" dia.
Structural Bolts to ASTM Specification A325
Tractor Bolts
Special Hot and Cold Headed Parts

Facilities to make larger diameters than listed.

Ask your jobber for CleCap!

Originators of the Kaufman DOUBLE EXTRUSION Process

West Gets $1-Billion In Defense Work

Guided missiles, military vehicles make up bulk of Ordnance orders for Pacific and Mountain areas . . . Los Angeles District leads U. S. in weapons research work . . . Need ammunition plants . . . By R. R. Kay.

♦ ARMY ORDNANCE is shelling out a bang-up $1.07 billion to the West. And new orders keep building up the area's ordnance importance. Business will continue very strong through 1955.

Pentagon planning calls for upped military buying next year, and with guided missiles—a major ordnance item in the West—assuming rapidly increasing importance, the ordnance industry here will be busier than a toad tied to an ant hill. And the market for metalworking goods, equipment, and services will be even bigger.

Survey Ordnance Business . . . THE IRON AGE surveyed the vast area from the Mexican border to Canada, checking on ordnance business in nine far-western states.

A solid $470 million is now on the books in Oregon, Washington, Idaho, Montana, Wyoming, northern California, and part of Nevada.

About half is in the automotive field: armored infantry carriers, self-propelled artillery vehicles, and parts. Ammunition parts, rocket components, and artillery pieces get much of the balance of some 312 contracts.

San Francisco and near-by San Jose, with orders for $175 million, were off a bit the past six months as many of the smaller contracts were completed. However, the larger contracts will continue to hold the dollar volume up.

See **Continued Prosperity** . . . Proposals are in on three good-sized orders, and the Regional Ordnance Office feels that the Pacific Northwest has an excellent chance to get a nice share of the business.

Arizona, Utah, southern California, and parts of Nevada and Texas (Los Angeles Ordnance District) share over $600 million in Army Ordnance contracts: $500 million in production and $100 million in research and development. Bulk of the production work, $350 million, is in guided missiles. And although some of the prime contracts are held in the East, 60-80 pct of the work is done in the Los Angeles area.

Many Missile Jobs . . . Production contracts, about 300 in force at the moment, involve some 250 firms. Missiles made in California are: Nike, antiaircraft missile; Corporal, long range surface-to-surface missile; and Honest John, rocket artillery weapon. The area also produces fire control mechanisms for tanks and anti-aircraft artillery, and metal components for various types of ammunition.

The $100 million in research and development puts the Los Angeles Ordnance District in the number one spot for the entire country in dollar value and number of this type of contract. A total of 160 contracts are shared by 85-100 firms.

Four Strong Points . . . Four factors team up to give southern California its strong position in the missile field: 1. Availability of the airframe industry's aerodynamic experience. 2. The 13-million government-owned Jet Propulsion Laboratory operated by California Institute of Technology. 3. Heavy concentration of electronics manufacturers (see THE IRON AGE, July 29, 1954, p. 75). 4. An increasing number of eastern branch plants widen the range of equipment, materials, and skills available for ordnance work.

West Coast metalworking plants could probably further increase their ordnance business if there were sizable ammunition loading factories here. As it stands now, firms near the principal loading factories in the South and Mid-West have a real advantage.

Use Double Shells . . . Future commercial air transports are likely to have a double fuselage, at least 8 in. thick and twice the weight of present single shell structures, according to acoustic engineers at Douglas Aircraft Co., Inc., Santa Monica, Calif.

Double fuselage design will be the first step toward reducing noises which rise as engine power, size, and speed of the aircraft increase, they report.

How to Pick the Right Cutting Oil

WORD OF MOUTH?
It gives you the answer sometimes, but not many of your friends have the same cutting oil requirements and the same problems that you have. It's much surer to depend on specialists like Sun.

LABORATORY ANALYSIS?
Sure. But there's no formula for correlating the laboratory analysis with how well the cutting oil will work on your job. It takes years of field experience like Sun's to help you make the right choice.

ELABORATE SHOP TEST?
This will probably give you the answer. But it's expensive and interferes with production when you try to test all the oils available. Sun's experience can help keep your shop-testing to a minimum.

EXPERIENCE IS THE ANSWER.
And Sun has it. Its field representatives have probably come across problems similar to yours many times. If they haven't, its cutting oil specialists and metallurgical technicians are ready to help with your problem.

Soluble or straight, transparent or black, light or heavy duty—Sun makes the kind of cutting oil you need to handle your job at the lowest cost. For more information, call your nearest Sun office or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. IA-12.

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MACHINE TOOL HIGH SPOTS

Put Stress on Cost Reduction

Machinability consultant explains how to lower machine cutting costs, tool replacement and idle costs . . . New machine tool orders, shipments drop . . . Backlog now between 3 to 4 months—*By E. J. Egan, Jr.*

♦ OWNERS AND MANAGERS of jobbing machine shops or job shop departments aren't likely prospects for automation in the form of specialized transfer equipment. But they're vitally interested in general purpose machine tools which will reduce (1) actual machine cutting costs, (2) tool replacement costs, (3) idle costs.

Some detailed suggestions on these three cost-reduction areas were offered to builders in a speech delivered at the recent American Machine Tool Distributors Assn. convention. Speaker was Dr. William W. Gilbert, General Electric Corp. machinability consultant. His talk summarized user opinions gathered during a tour of job machine shop departments in various GE plants.

Boost Cutting Speeds . . . Actual machine cutting costs may be reduced by planning to take full advantage of modern metal cutting research, according to Dr. Gilbert. Cutting rates can often be boosted many times with increased feeds and speeds, multiple tools of best design, and use of free-cutting materials, he said.

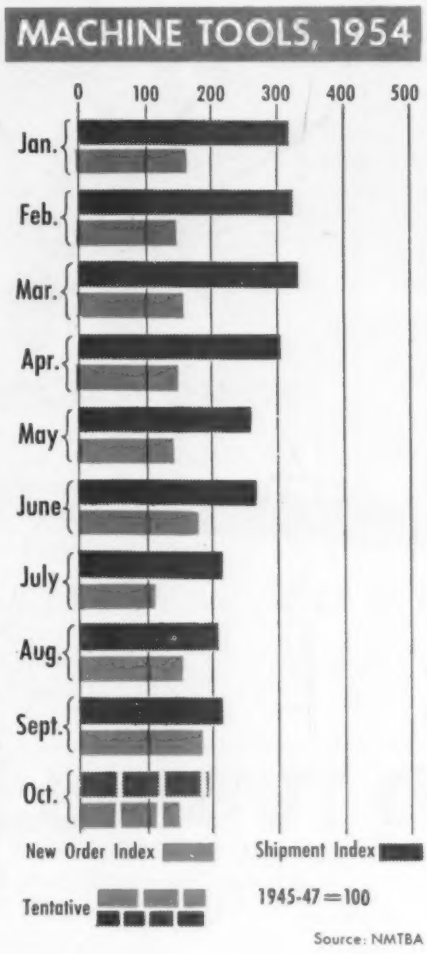
Most modern machine tools are adequately powered, he added, but users find they tend to vibrate too much when the harder carbide tool grades are used to take heavy cuts at high speeds.

To cut tool changing time and costs, Dr. Gilbert suggested builders provide for greater use of preset or prelocated tools with quick-change tool holders. He said the square, triangular or round insert type of carbide tool, which can be indexed simply, offers this ideal combination of prelocation and rapid changeability.

Other suggestions in the tooling area offer food for thought for general purpose machine tool users. One was to limit the tool wear allowed on any job on the theory that "replacing a little too soon is better than too late." Another suggestion was to standardize and simplify grinding.

Cut Idle Time . . . Idle, non-productive time was outlined as the major area for potential cost reduction. Positioning cutting tools for quick accessibility is important to users, Dr. Gilbert said. Power indexing of turrets on some larger machines would be beneficial in decreasing operator fatigue. Standardized spindle mountings were suggested so that interchangeable arbors, chucks and tool holders could be used on a variety of similar machines.

Loading and unloading large heavy workpieces is a significant cost factor in the non-productive time area, Dr. Gilbert said. He suggested that standard equipment might include work holding devices sufficiently rigid to match the capabilities of the machine tool.



Use More Lights . . . Insufficient factory lighting prompted the suggestion that builders put lights on machine tools to illuminate not only the working area, but storage cabinets and tables where drawings must be read.

Builders' adherence to NMTBA and JIC standards should eliminate most user difficulties in servicing and maintaining complicated electrical and hydraulic control systems, Dr. Gilbert said. He added that motors and controls should always be conveniently located for maintenance or replacement.

New Orders Off . . . An estimated new order drop of nearly 18 pct from September's level took machine tool builders by surprise. October statistics compiled by NMTBA show the estimated new order index down to 148.9.

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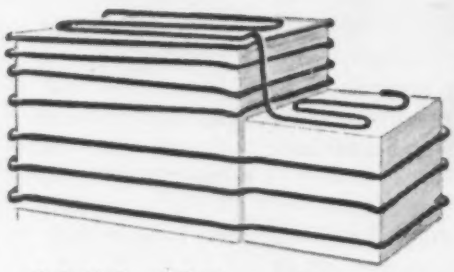

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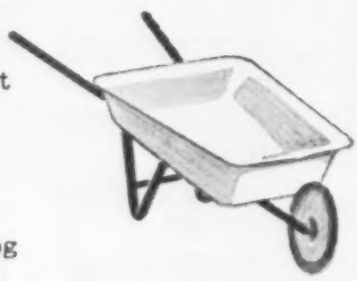

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the iron age
FOUNDED 1855
TECHNICAL ARTICLES

Harden best by freezing—

New Stainless Alloy "Bridges Gap" Between 300 and 400 Series

◆ A new type of stainless steel, AM 350, has been developed to bridge the gap between the 300 and 400 series . . . In the annealed condition the alloy is essentially austenitic with good ductility but, unlike the 300 series, it can be hardened by heat treatment.

◆ Hardening can be accomplished by either a precipitation hardening treatment or by sub-zero cooling . . . The sub-zero cooling method of hardening is preferred because of superior hardness, strength, ductility, impact strength and corrosion resistance.

By A. J. LENA, Associate Director of Research,
Research Laboratory, Allegheny Ludlum Steel Corp., Brackenridge, Pa.

◆ THE GOOD FORMING properties of the austenitic stainless steels, plus the ability to be hardened at temperatures low enough to prevent excessive scaling and distortion, are combined in a new stainless steel. With the new alloy, Allegheny Metal 350, a desirable combination of high hardness and strength, good impact strength at low temperatures and good corrosion resistance can be achieved by a refrigeration and tempering heat treatment.

Use of a refrigerating treatment without simultaneous working of the metal to develop strength constitutes a new approach to the problem of precipitation hardening stainless steels. Use of a refrigerating treatment does not involve precipitation of a second phase. As a result, AM 350 when hardened by sub-zero cooling and tempering is not truly a precipitation hardening stainless steel. It does, however, achieve the same effect as a precipitation hardening steel without the decrease in impact strength and corrosion resistance associated with the precipitation of a second phase in stainless steel.

AM 350 can be treated as a conventional precipitation hardening stainless steel in that it can be hardened by a double-aging. The impact strengths and corrosion resistance obtained while below those obtained by sub-zero cooling and tempering, are still comparatively high for precipitation hardening stainless steels.

The new alloy is a chromium-nickel-molybdenum stainless steel, with a nominal composition as given in Table I. This alloy composition achieves such a balance that the austenite which forms on annealing is retained when cooled to room temperature but is capable of transforming to martensite when cooled to −100°F. This

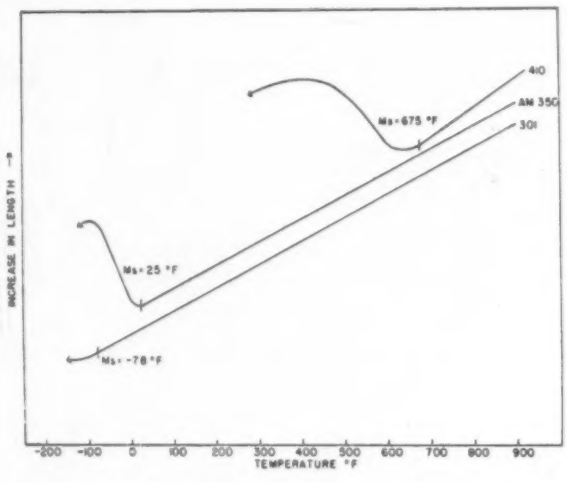


FIG. 1—Dilatometric cooling curves for type 410, 301 and AM-350 showing Ms temperatures.

TABLE I Nominal Composition of AM 350

C	Mn	Si	Cr	Ni	Mo
0.08	0.60	0.40	17.0	4.2	2.75

TABLE II Tensile Properties and Bend Ductility

Treatment	Hardness	Yield Strength, psi 0.2 pct	Tensile Strength, psi	Elongation in 2 in., pct	Bend Angle D = 2t
Annealed, 1900°F, ½ hr., air cooled	Rb 93	44,900	103,700	22	180°
Annealed and sub-zero cooled, 1 hr at −100°F	Rc 43	118,000	200,000	10.0	120°
Annealed, sub-zero cooled, and tempered for 2 hr at 750°F	Rc 42	147,700	193,200	13.5	180°
Annealed and intermediate aged for 1 hr at 1350°F	Rc 35	111,400	161,500	8	60°
Annealed, intermediate aged and final aged for 1 hr at 850°F	Rc 38.5	142,700	171,500	11.5	95°
Full Hard Type 301 Specification	—	140,000 min	185,000 min	9	—

TABLE III Impact Strength (Charpy V Notch)

Treatment*	Hardness	Impact Strength, ft-lb Room Temperature	Impact Strength, ft-lb −40°F
Annealed	Rb 96	110	--
Sub-zero Cooled	Rc 40	—	55
Sub-zero Cooled and Tempered	Rc 41	51	36
Intermediate Aged	Rc 32	33	22
Double-Aged	Rc 36	23	15

* Treatments see Table II.

TABLE IV Short Time High Temperature Tensile Properties

Testing Temp., Deg F	Yield Strength, psi Double Aged	Yield Strength, psi Sub-zero Cooled and Tempered	Tensile Strength, psi Double Aged	Tensile Strength, psi Sub-zero Cooled and Tempered	Elongation, pct Double-Aged	Elongation, pct Sub-zero Cooled and Tempered
Room Temp.	142,700	146,900	171,500	191,900	11.5	13.5
800	110,650	116,500	161,650	179,100	10.0	13.5
900	106,650	100,125	148,250	158,950	12	8.0
1000	80,150	83,250	103,225	104,250	8.0	9.0
1100	46,420	46,830	55,700	67,970	16.5	16.0
1200	25,670	29,230	40,380	45,240	66.0	42.0

Type 410 — Hardened and Drawn

Testing Temp., Deg F	Yield Strength, psi	Tensile Strength, psi	Elongation, pct
800	69,595	79,955	4.5
900	51,680	65,160	10.0

TABLE V Effect of Cold Rolling and Aging

Reduction in Thickness, pct	Hardness	0.2 Pct Yield Strength, psi	Tensile Strength, psi	Elongation in 2 in., pct
0 (Annealed)	Rb 95	44,700	169,220	20.5
5	Rc 24	61,230	176,650	15.5
10	Rc 34	76,685	174,630	13.5
20	Rc 41	145,400	195,000	8.5
30	Rc 42	210,130	223,220	2.5
40	Rc 42.5	213,320	222,780	2.0
20 and aged for 2 hr at 800°F	Rc 42	176,980	197,850	15
30 and aged for ½ hr at 850°F	Rc 45	223,910	224,160	3.0
40 and aged for ½ hr at 850°F	Rc 46	235,880	236,420	2.0

* Sheet initially 0.064 in. thick.

TABLE VI Corrosion Rates in Various Media

Condition	Hardness	1 Pct Sulfuric Acid[1]	Acetic Acid[2]	Nitric Acid[3]
Sub-Zero Cooled	Rc 40	—	—	0.0055
Sub-Zero Cooled and Tempered	Rc 41	0.00011	0.00025	0.0076
Double-Aged	Rc 36	0.00775	0.00058	0.0128

[1] 2-hr test at 100°F—Type 304 = 0.0048 in./mo.

[2] Boiling Concentrated Glacial Acetic Acid— Average of five 48-hour periods—Type 304 = 0.002 in./mo.

[3] Boiling 65 pct HNO_3—Average of five 48-hour periods—Type 304 = 0.001 in./mo.—Type 410 = 0.012 in./mo.

Properties are similar to annealed austenitic stainless, but AM 350 can be hardened . . .

transformation to martensite causes a significant increase in hardness and strength.

AM 350 has properties similar to austenitic stainless steels in the annealed condition but, unlike them, can be hardened by heat treatment. Although the actual heat treatment is somewhat different, the mechanism of hardening of AM 350 is identical with that of the hardenable stainless steels in that both depend upon the formation of martensite from austenite. Thus, this new alloy combines the desirable forming properties of the austenitic grades with the high hardness and strength properties of the hardenable grades.

Reason for this behavior can be understood by considering a basic metallurgical difference between the hardenable stainless steels such as type 410 and the austenitic types such as type 301. Both consist of austenite at 1800°F; but, while the hardenable grades transform to martensite on cooling to room temperature, the austenitic grades retain their austenite even when cooled to temperatures far below room temperature.

A major difference between these types, therefore, is in the degree of austenite stability which can be quantitatively shown by the temperature where the transformation of austenite to martensite (Ms temperature) begins. One method of determining these temperatures is by dilatometric cooling curves, Fig. 1, where the Ms temperature is that temperature where the sample begins to increase in length.

A further difference between types 301 and 410 is in the amount of transformation which occurs on cooling. Although type 301 has an Ms temperature, the total amount of transformation which occurs even when cooled to a liquid nitrogen temperature (−320°F) is not sufficient to produce large increases in the metal's hardness.

With respect to austenite stability, the new alloy occupies an intermediate position between the austenitic and the hardenable steels as shown by the transformation temperature, Fig. 1. This degree of stability is achieved by proper balance of the component elements and is such that the transformation temperature is located below room temperature.

The new alloy is annealed by heating to 1700°-1900°F and cooling to room temperature at a rate sufficiently fast to prevent precipitation of chromium carbides. In the case of sheet or strip, air cooling is sufficient. Since cooling is interrupted at room temperature, the predominantly austenitic structure which forms at the annealing temperature is retained and the alloy is in its most soft and ductile condition. The annealed microstructure consists of islands of ferrite in a matrix of austenite.

Cool to —100°F or lower

Hardening of AM 350 by heat treatment can be accomplished by either (1) sub-zero cooling and tempering or (2) by double-aging.

Because transformation temperature is below room temperature one method of hardening AM 350 is to sub-zero cool to between −80 to −100°F or lower using refrigeration or mixed dry ice and acetone. Holding time at the sub-zero temperature is not critical but should be sufficiently long to insure that the piece being treated reaches the desired temperature.

For maximum strength and ductility, the sub-zero cooling hardening should be followed by a 1 to 2 hour tempering treatment in the range of 750° to 900°F. A 2-hour temper at 750°F has been found most desirable from the standpoint of increasing strength and ductility without seriously detracting from the corrosion resistance of the alloy, it has been found.

Because of the low temperature involved in

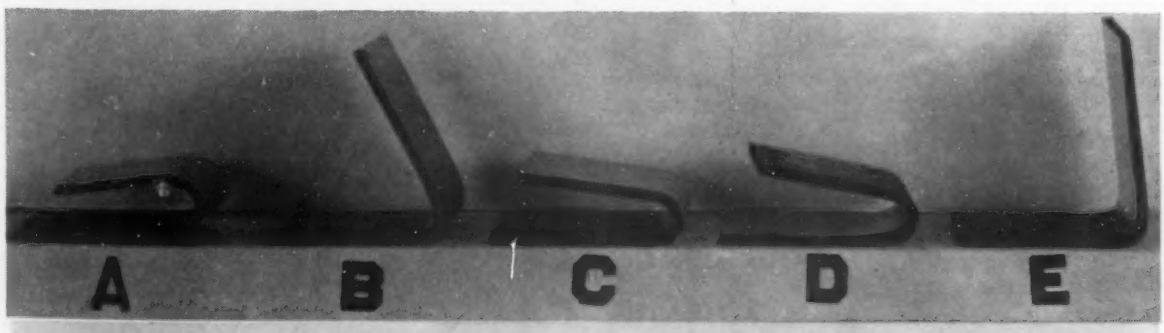


FIG. 2—Bend ductility of AM-350 is shown in these samples: A, annealed, RB 93, 180° bend; B, sub-zero cooled, RC 41, 120° bend; C, sub-zero cooled, tempered 1 hour at 750°F, RC 41, 180° bend cracked; D, sub-zero cooled, tempered 2 hours at 750°F, RC 42, 180° bend; E, double-aged, RC 38.5, 95° bend. The alloy can be fabricated by generally used methods.

The alloy has a high rate of work hardening . . . Cold work gives large boosts in strength . . .

the sub-zero cool and temper hardening method, scaling is not a problem. Only slight discoloration occurs as a result of the 750°F temper. The microstructure of the alloy in the sub-zero cooled and tempered condition consists of ferrite in a matrix of martensite.

Hardening by double-aging involves a two stage precipitation hardening heat treatment. The first stage, consisting of a 1 to 2 hour treatment at 1300°-1400°F, results in precipitation of chromium carbides. This alters the composition of the austenite so that it transforms to martensite on cooling to room temperature. This stage is an intermediate aging treatment. Further increase in hardness and strength is obtained when the intermediate aging is followed by a final treatment for 1 to 2 hours at 800°-900°F.

A recommended double-aging treatment consists of exposing annealed material for 1 hour at 1300°-1350°F followed by 1 hour at 850°F. Microstructure of the steel in this condition consists of chromium carbides around the ferrite islands and at austenite grain boundaries within a matrix of martensite.

Annealed alloy stands 180° bend

Tensile properties and bend ductility of a typical heat of AM 350 in the annealed and hardened conditions are given in Table II. Annealed, the metal has a hardness of RB 92 to 97 and elongation in 2 in. in excess of 20 pct. The annealed alloy will withstand a bend of 180° and can be fabricated by conventional methods.

Hardness is increased to RC 40 or greater by sub-zero cooling and tensile properties become equivalent to type 304 in the half-hard condition. Tempering at 750°F has little effect on hardness but an increase in yield strength of better than 25 pct with an increase in both tensile elongation and bend ductility is obtained.

In the sub-zero cooled and tempered condition, the alloy has tensile properties in excess of the minimum specifications for full hard type 301. Unlike type 301, AM 350 does not require cold rolling to develop these high strengths and hence no difference is observed between transverse and longitudinal tensile properties.

Although yield strengths in excess of 140,000 psi are obtained by double-aging, the properties are in general somewhat inferior to those obtained by sub-zero cooling and tempering. Fig. 2 shows the bend ductility of AM 350 after various heat treatments. Sample D, sub-zero cooled and tempered for 2 hours at 750°F, withstood a full 180° bend with a hardness of RC 42. Sample E, double-aged, withstood only a 95° bend in spite of a lower hardness. This lower ductility is a direct consequence of the carbide precipitation required in double-aging and would occur in any stainless steel subjected to a heat treatment capable of producing intergranular carbide precipitation. The double aging treatment is not sensitive to annealing treatment and yield strengths in excess of 170,000 psi are obtained on material annealed between 1700° and 1900°F.

As hardened by sub-zero cooling and tempering, AM 350 has good impact strength, Table III. Charpy V notch impact strength in this condition is 51 ft-lb at room temperature and 36 ft-lb at −40°F. Although the impact strengths obtained by double-aging are less than half of these values (23 and 15 ft-lb respectively), they are still higher than ordinarily expected of precipitation hardening alloys.

For applications below 1000°F

The short time high temperature tensile properties of AM 350 in the range of 800° to 1200°F, Table IV, can be compared with type 410 stainless steel in the hardened and drawn condition. AM 350 has a higher yield and tensile strength at 1000°F than type 410 at 800°F. The rapid change in properties of AM 350 at 1200°F is due to the formation of austenite which begins at 1150°F. Use of the new alloy will be restricted to applications involving temperatures below 1000°F. The stress to rupture in 1000 hours at 900°F is 92,000 and 98,000 psi for the double aged and sub-zero cooled and tempered conditions of the metal respectively.

AM 350 has a high rate of work hardening; hence, large increases in hardness and strength can be obtained by cold working. Yield strengths in excess of 200,000 psi, Table V, are readily obtainable. Further improvement in hardness and strength can be obtained by a single short time aging treatement between 800° and 900°F.

Corrosion rates in various media are given in Table VI. The corrosion resistance of AM 350 after hardening by sub-zero cooling and tempering is comparable to type 316 stainless steel and superior to type 304 in glacial acetic acid and 1 pct sulphuric acid.

Cool without temper for best resistance

Maximum resistance to attack by boiling 65 pct nitric acid is obtained when AM 350 is in the sub-zero cooled condition without tempering. The nitric acid rates are greater than type 304 but are less than other hardenable stainless steels such as type 410. Because of the carbide precipitation which occurs during double-aging, the corrosion resistance in all media is poorer in the double-aged condition than when sub-zero cooled and tempered. The resistance of AM 350 to pitting type attack in 20 pct sodium chloride salt spray test is excellent.

Modern Centerless Grinding Speeds Output of Precision Parts

◆ Successful centerless grinding needs efficient feeding methods . . . Standard practice is to use infeed for variable diameter or headed parts, through feed for cylinders, and end feed for short tapers . . . But centerless grinding experts have worked out some combination work feeding techniques to cut time and costs on tough jobs.

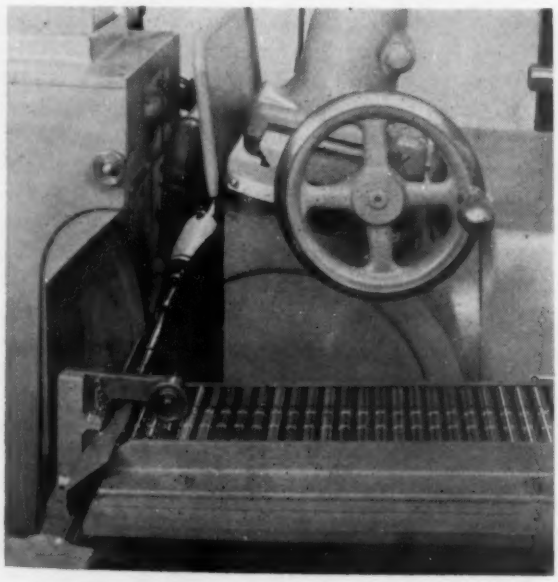
Part II

By J. E. HYLER, Consultant
John E. Hyler & Associates, Peoria, Ill.

◆ THROUGH FEED, infeed, end feed and combination feed techniques are all used in modern centerless grinding practice. Infeed grinding is applied on workpieces such as bolts, where the head will not permit through feeding, or on parts having a shoulder or other section larger than the diameter being ground.

If such work is not longer than the face width of the grinding wheel, there is no axial work travel during grinding. Although the regulating wheel is theoretically set with its arbor horizontal, in many cases it is actually set slightly oblique to hold the small end of the workpiece snugly against the stop.

The grinding machine is frequently provided with a manually operated infeed lever which moves the regulating wheel to and from the abrasive wheel. The setup is arranged so that the lever action advances the regulating wheel just far enough to size the work perfectly. Different variations of infeed setups are also used.



MAGAZINE feeding setup speeds centerless grinding of ball bearing grooves in pump shafts.

Light work which is in-fed can sometimes be unloaded by gravity as the regulating wheel is withdrawn. More often, some kind of manual or automatic ejector is used as the regulating wheel retracts from the work.

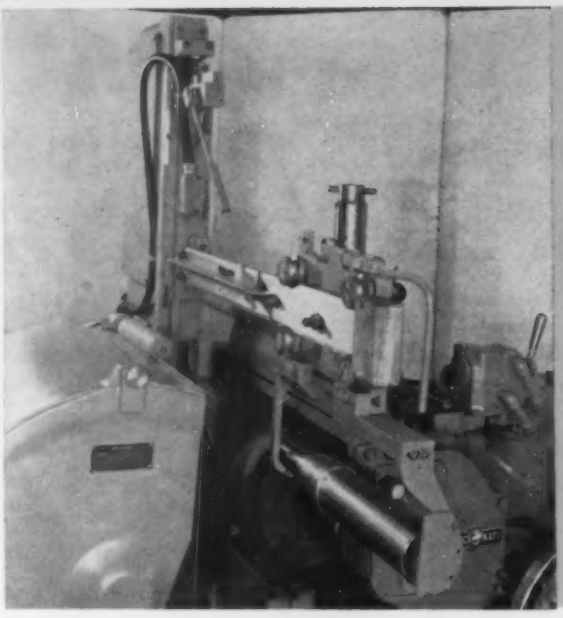
The end feed technique is used for grinding tapers where the length of taper does not exceed face width of the wheel. This is a matter of dressing the faces of the grinding wheel and regulating wheel on similar bevels and feeding workpieces axially until they encounter a stop. The workpiece is removed from the machine on the same line by which it entered, and all pieces are ground to uniform taper and size. Such jobs are not commonplace but the end feed method is highly useful in these cases.

Remove more metal in one operation

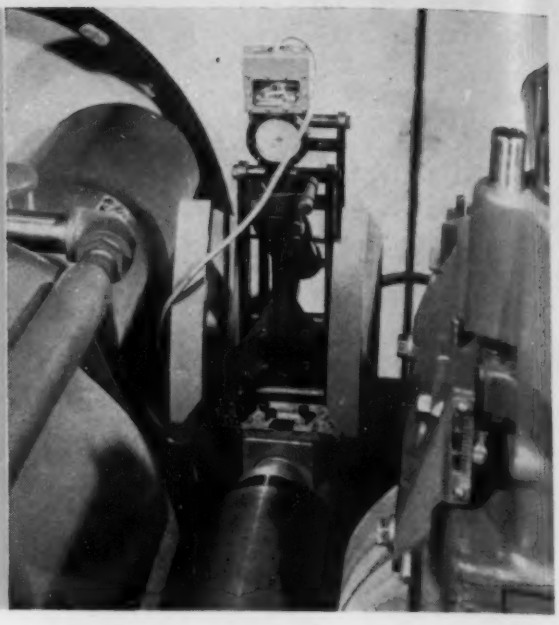
Infeeding makes it practical to remove much more metal in a single operation than by through feeding. And where workpieces are not longer than the face width of the grinding wheel, an extra heavy cut may be made by using a combination type of feed. Here the infeed lever is moved down against a positive stop as though regular infeed grinding were being done. However, the regulating wheel is set obliquely so it will traverse the workpiece across the wheel at the same time.

If part length is slightly greater than wheel-

MR. HYLER has contributed numerous technical articles to The Iron Age. His knowledge of metalworking machinery and methods is based on more than 20 years of practical shop experience. Part I of this series appeared in the Nov. 25 issue. Part III will appear in the Dec. 9 issue.



FIXTURE loading simplifies simultaneous grinding of four diameters on this 35-lb spindle.



AUTOMATIC caliper-type gage provides constant sizing control while this axle end is ground.

face width, the regulating wheel axis must be set at a certain minimum angle. This insures that infeed motion will encounter its positive stop before the first end of the part emerges from between the wheels.

This combination of through feed and infeed also works well for grinding the smaller diameter of two-diameter parts and is useful for grinding headed parts such as long bolts. In such cases, work can be in-fed close to the shoulder of the larger diameter or close to a bolt head until it reaches the positive infeed stop. The part can then be through-fed for the remainder of the grinding operation on the smaller diameter.

It has been pointed out that the greater the degree of obliquity in the regulating wheel on through-feed grinding, the faster the work will be traversed axially. Thus from the standpoint of grinding time, a maximum oblique setting on the regulating wheel is advisable. But since a better finish will result where work is not traversed too fast, the regulating wheel angle will usually be a compromise.

Proper wheel selection important

It cannot be denied that difficult grinding problems are often solved mainly by selecting a proper abrasive wheel. For example, centerless grinding on thin-walled work is entirely different from processing relatively solid parts. Thin sections dissipate grinding heat slowly and proper wheel selection is important in obtaining maximum good results under unfavorable conditions.

Automatic wheel truing at predetermined intervals also provides definite advantages in centerless grinding. One example shows up in the grinding of thin-walled cast iron sleeves for cylinder blocks. To avoid the overheating and subsequent collapse of these parts, it is essential not only to provide an adequate coolant supply, but also to keep the grinding wheel in first-class cutting condition.

A counting device controls this automatic truing operation. It is actuated by movement of the regulating wheel slide and starts the truing cycle whenever a predetermined number of parts have been ground.

Centerless brushing gives smooth finish

Centerless brushing is often used to produce a smoother part finish. The same machine unit is frequently converted from centerless grinding to brushing in just a few minutes. Centerless polishing machines, using fine abrasive belts, also produce superior finishes on work which has previously been centerless ground.

In some cases, special work feed techniques have been developed for centerless grinders. Until just a few years ago cylindrical bars with long center sections and upset ends were not considered suitable for centerless grinding. But a system was devised for crane-loading such bars into a V-type cradle at the infeed end of the machine. The cradle is supported by a suitable floor stand.

On one job these bars have a center section 65 in. long and weigh nearly 100 lb. When a bar has been loaded in the V-type cradle, an initial plunge cut is taken just inside one upset end until required diameter is reached. During the plunge cut an end stop prevents the bar from moving lengthwise. As soon as required diameter is attained the grinder operator swings the end stop aside, allowing through-feed operation to start.

On the outfeed side of the grinder, a special

long-bar grinding attachment incorporates three roller-type, rise-and-fall supports. All three supports are in lowered position as through feed on the work begins. As soon as the upset end of the bar advances past the first support, the operator raises the support to contact the ground section of the bar. This support bears the weight of the ground section already fed out of the machine, until the advancing upset end passes the second support.

Loading fixture lessens fatigue

At this point, the second support is lifted to contact the ground portion of the bar, and the first support is lowered again. In like manner, the advancing ground section is supported by the third roller when support No. 2 is lowered. An end stop beyond the third roller support is set to terminate through feed of the bar just before the last upset end engages the abrasive wheel. The end stop features a limit switch which automatically stops and retracts the regulating wheel. This prevents a flat from being ground on the last end of the bar.

Modern centerless grinders frequently feature multiple wheel setups, special loading devices and automatic truing equipment to handle difficult jobs with speed and precision. With twin wheels, both ends of single throw crankshafts are now ground in a single operation. In another setup for simultaneously grinding four diameters on 35-lb wheel spindles, a special loading fixture lessens operator fatigue.

On one job where annular grooves are ground in pump shafts to a tolerance of 0.0005 in., production of six pieces per cut was obtained. After a slight change in setup, it was possible to obtain from 350 to 400 shafts per wheel truing, as well as obtaining parts ground with a 10 microinch finish.

Spherical grinding is done efficiently on centerless grinders through the use of a wobble-type regulating wheel. Billiard balls, bowling balls, and various sizes of metal balls are ground by this method.

A two-wheel setup for simultaneously grinding two trunnion diameters on universal joint spiders also features profile hydraulic truing units for the regulating and grinding wheels. In addition there is an automatic infeed attachment, and a hydraulically operated loading fixture.

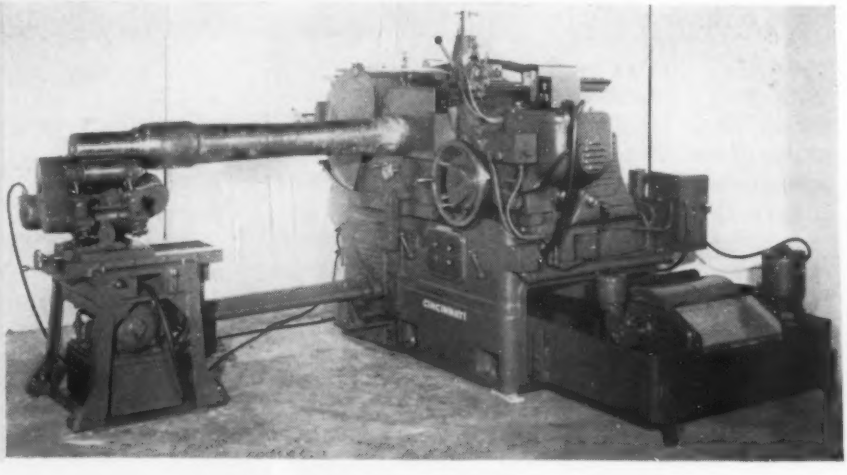
The loading assembly consists of a work holding cradle attached to an elevator device. The operator places a workpiece in the cradle fingers and the elevator lowers it to grinding position. After grinding, the cradle is raised for manual unloading. Operation of the elevator is synchronized perfectly with the automatic infeed attachment.

Grinding the ends of railroad car axles on a plain, self-contained grinder once took up to 20 minutes for each end, exclusive of handling and turn-around time. Modern practice uses two centerless machines for infeed grinding of bearing surfaces, dust collars and intermediate fillets. Each machine handles one end of the axle in turn, with an automatic transfer from the first grinder to the second.

While one end of the car axle is supported on the work rest, the opposite end is supported by an outboard device on which a power-driven roll and an idler roll contact the cylindrical surface. This outboard support is adjustable to match the height of the work support at the end being ground. A servomechanism traverses the outboard support toward the abrasive wheel at exactly the same rate as the end being ground.

A caliper type Federal gage automatically controls the finished size on this axle operation. Three signal lights indicate when work is (1) oversize, (2) approaching final size, (3) at final size. An ammeter measures the load on the grinder's 40-hp motor. By watching the motor load the grinder operator can set the automatic infeed rate for maximum efficiency.

A system of three signal lights is connected to the size control. One of these lights indicates while the work is oversize. Another shows when the work is approaching size. The third shows when the work is down to size. The operator has constant knowledge of grinding progress.



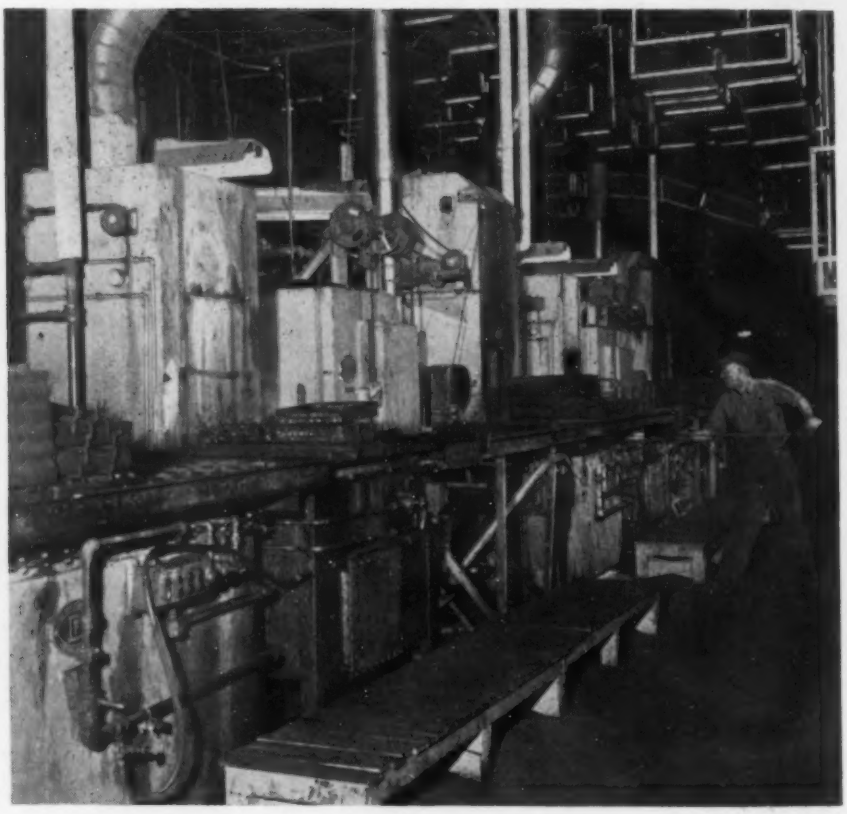
MACHINE and work support setup for centerless grinding ends of heavy railroad car axles.

Minimum distortion—

Small Parts Hardened to Precise Limits in Sealed, Batch-Type Furnaces

By W. G. PATTON, Asst. Technical Editor

◆ A "sealed cycle" batch-type furnace is used by Buick Motor Div. to harden small parts where precise metallurgical control and minimum distortion are mandatory . . . A hot oil quench at 325°F is used without excessive loss of oil . . . Case hardening with minimum distortion permits honing instead of internal grinding on critical transmission gears and similar parts.



FLEXIBILITY and maximum hardness control are obtained in these Dow furnaces. Special trays improve uniform quenching of each piece.

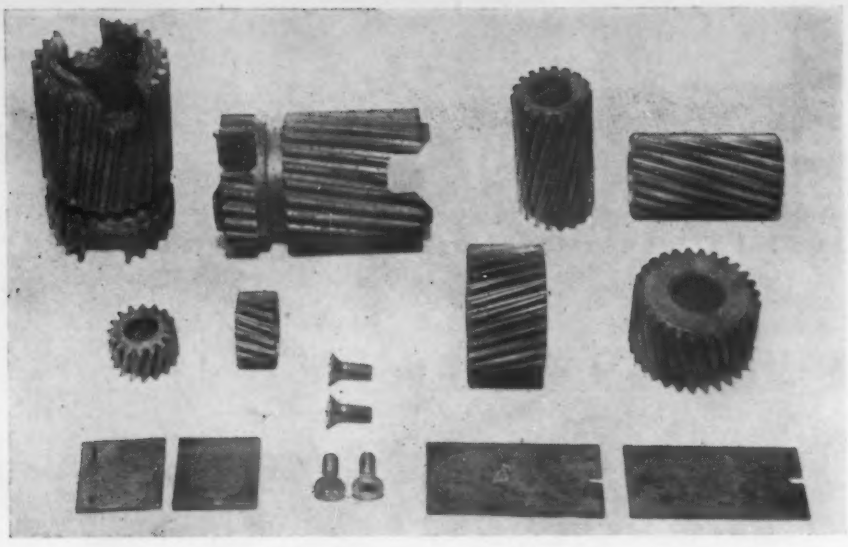
◆ MINIMUM DISTORTION, flexibility and high output of quality parts has been achieved in the heat treat department at Buick Motor Div. through the use of a batch-type, controlled atmosphere furnace. The atmosphere is controlled (1) in the vestibule, (2) in the furnace, and (3) in the quench. The furnace was built by Dow Furnace Co., Detroit.

Small parts requiring optimum hardness and minimum distortion are held at 1525°F, washed, and then tempered at 400°F.

After tempering, SAE 1330-H parts develop a case hardness of Rc 52-56. The capacity of the furnace in processing parts with this case depth is approximately 300 lb net for a 1¾-hour carburizing cycle.

Typical parts hardened in the Dow furnaces are small planetary gears, brake band struts and speedometer gears. Each of these parts requires close control of the case and minimum distortion during heat treatment. Parts are loaded on special trays designed to provide uniform quenching of each piece.

Using this hot oil-quench treatment, a uni-



TYPICAL PARTS hardened in the sealed, batch-type furnace include small planetary gears, brake band struts and speedometer gears.

formly hard case free from decarburization is developed. In a typical small gear used in Buick "Dynaflow" transmissions, distortion of the hole in the gear is regularly held to less than 0.0005 in.

The unwind of the helical teeth is consistent, piece to piece and load to load. Because distortion is minimized, a honing operation, rather than internal grinding, can be used to produce parts that meet Buick's exacting specifications.

In addition to small regular production parts, this heat treat equipment is being employed to harden a wide range of experimental parts.

The "sealed cycle" furnace design affords complete protection of the furnace atmosphere against air contamination, since the furnace is unloaded and reloaded without having both doors open at the some time.

Cycling of the furnace is as follows: upon opening the inner door and the vestibule door port the processed charge, ready for quenching, is transferred to the lower station of the vestibule elevator. The elevator then lowers this charge into the hot oil quench, and at the same time lowers the green charge which has been preheating on the upper station into line with the chamber hearth. The green charge is transferred to the work chamber and the inner door closed. This is accomplished with a steel hook without opening the vestibule door. The entire operation is completed in a few seconds and occurs during an expansion of the atmosphere gases. Thus full protection of the work chamber is provided.

Maintain positive pressure in furnace

After a reasonable interval (dictated by the quench-time requirement) the vestibule door is opened and a new charge placed upon the upper elevator. The elevator is then raised and the quenched charge is withdrawn from the vestibule.

After turning a high flow of heating gas into the vestibule and igniting it to provide a rapid purge the outer door is closed. In a few seconds the air in the vestibule is exhausted and the gas begins to burn at the vestibule door port. The purge gas is now shut off and the port closed.

A positive pressure is maintained in the furnace and vestibule by the flow of atmosphere gas and is controlled by an automatic pressure relief valve mounted on the vestibule. This valve opens only after a definite pressure is attained and bypasses any excess gas above that necessary to maintain adequate pressure. This combination of an extremely fast purge and the pressure relief valve eliminates explosion hazards.

Oil temperature, viscosity held uniform

Each quench tank has a capacity of 750 gal and is completely sealed to prevent air entrainment by the quench oil. The oil used has a flash point of 550°F and after more than 8 months operation its viscosity has remained unchanged at approximately 100 sec at 210°F. Loss of oil has been less than 25 gal per week. The equipment is being operated 24 hours per day and a minimum of 5 days per week.

The quench oil is heated by a large gas-fired immersion tube and can be controlled at any temperature up to 400°F. Between quenches, the oil is continuously circulated at a low speed to maintain temperature and viscosity uniformity. Lowering a finished charge into the quench automatically increases the circulation speed to a predetermined high rate for effective quenching, by means of a variable speed drive.

Operating experience has shown that the use of a sealed batch-type furnace permits maximum flexibility of operation while providing optimum control of case hardness and microstructure. In addition to uniform response to heat treatment and minimum distortion, the adoption of the hot oil quench has eliminated deterioration of baskets caused by salt corrosion.

Ability to finish gears by a simple honing operation has cut handling and machining costs.

For sheetmetal assembly—

Punched Lugs Provide

Rapid, Simple, Inexpensive Joining Method

By FEDERICO STRASSER, Consultant,
Santiago, Chile

◆ Bent lugs and fold-over edges may be used for assembly of a wide variety of sheetmetal parts . . . The tab-like sections are blanked, inserted in slots, then folded over to form a reasonably tight joint . . . Parts to be joined must be suitably proportioned, both as to surface and stock thickness . . . Joints have sufficient strength for many sheetmetal applications.

◆ FOLDING AND BENDING provide an economical method for joining sheetmetal components or sampings. No separate rivets or screws are needed and preparatory machining or other operations are few and simple. The method permits rapid assembly and joints are reasonably strong.

Some limitations must be considered in applying the method. It may be used only if the parts to be joined have suitable dimensions. Further, the joint is not very tight. As a result, folding should be used only where these drawbacks do not matter.

In assembly by folding, one workpiece is usually produced in a press operation with suitble lugs, Fig. 1. Narrow, longitudinal slots are punched where needed to provide a loose fit for the lugs, Fig. 2. Next the lug is bent at a right angle, introduced in the punched slot, and bent over to complete the joint. Using this method it is possible, for example, to fold the two ends of a flat sheetmetal part into a tube shape by punching lugs at one end and slots at the opposite end.

Whenever possible, several lugs should be used in an assembly. For added strength lugs should be bent in alternate directions as in Fig. 3.

It is not always possible to foresee the location or number of lugs required at the ends of sheetmetal parts. Provision for lugs may therefore be made in the middle of the part. For such cases, tools are used which cut and form lugs simultaneously. These lug-forming tools are available for press use. Lugs are introduced in the corresponding longitudinal slots of the counter-parts and folded down flat, Fig. 4.

Interior lugs of this type have a tendency to crack in the corners, where the greatest stresses are located. To avoid this difficulty, two small, round holes should be pierced at the corners.

Under favorable circumstances it is possible to join three workpieces by folding, as shown in A of Fig. 5. Folding may be used to assemble two parts, B of Fig. 5, by bending one strip or stamping edge over.

Thin and narrow strips are best assembled to stampings or sheets by first forming U-shaped sections, Fig. 6. The U-sections are inserted into the proper hole, which may be round, and are flattened.

Where locking action must be quite tight, lugs may be twisted. The simplest method of accomplishing this is shown at A in Fig. 7. Designs B and C are somewhat more expensive, but are also more effective in locking.

MR. STRASSER, well-known consultant and author, is presently in charge of tool design for a Chilean manufacturer of electrical and plastic components.

The lug-slot assembly offers a reasonably tight joint at low cost . . .

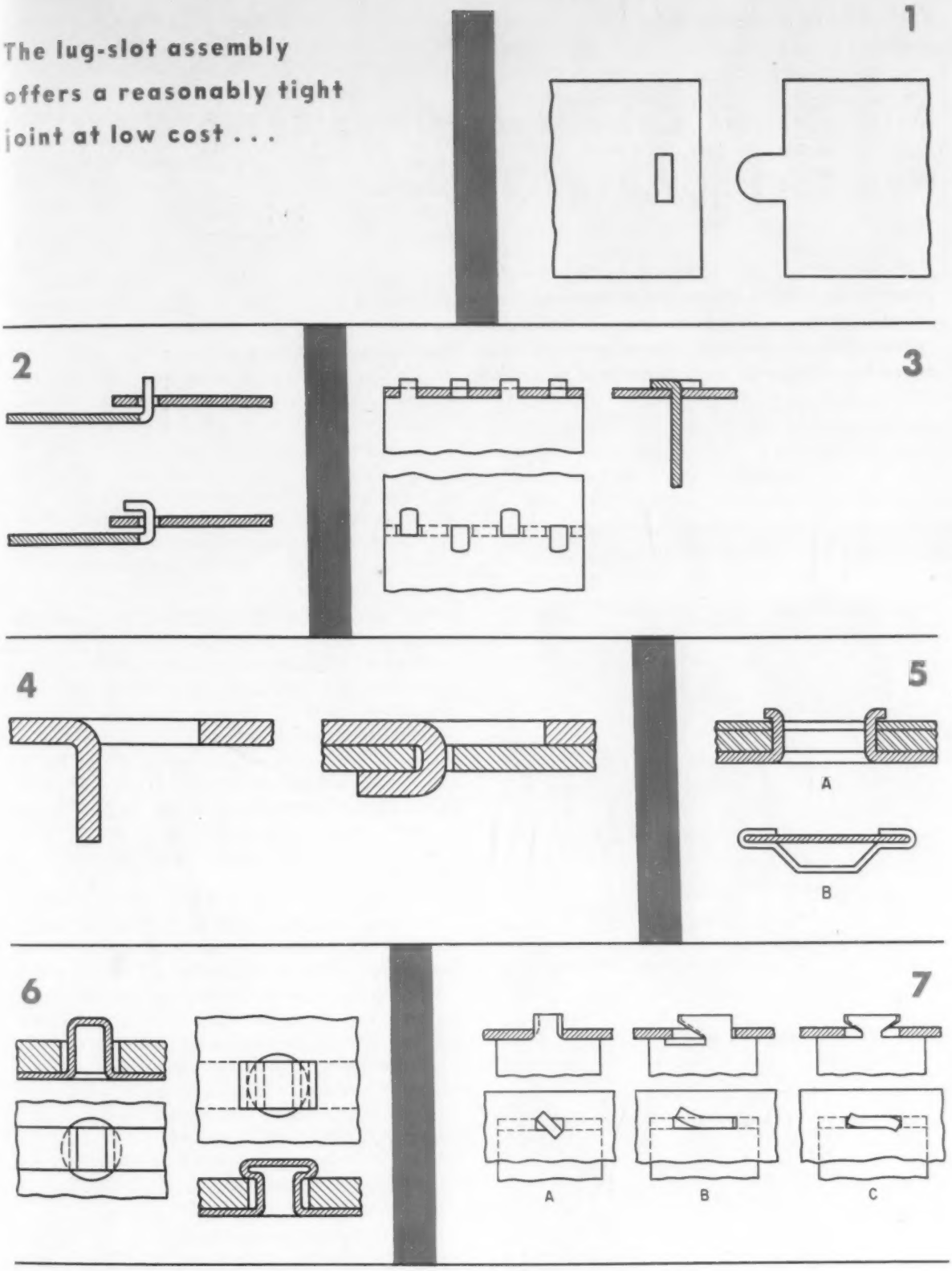


FIG. 1—Lug and slot are punched in sheetmetal parts in preparation for assembly.

FIG. 2—Lug is passed through slot and bent over. Joints have considerable strength.

FIG. 3—Where a series of lugs is used, alternate lugs should be bent in opposite directions.

FIG. 4—Special tools make it practical to form assembly lugs in any area of sheetmetal parts.

FIG. 5—Three pieces may be joined as at A. Or edges may be folded as shown at B.

FIG. 6—For thinner materials, a U section should be formed, assembled, then squeezed.

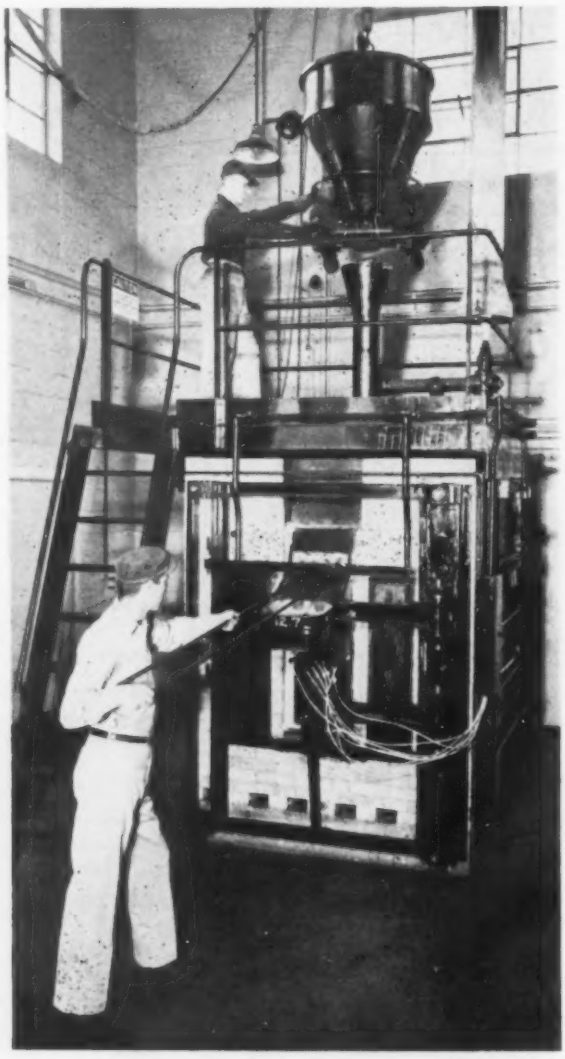
FIG. 7—For extra strength, lugs may be twisted. Parts are drawn together more tightly.

Full-scale results—

Pilot-Plant Coke Oven Gives Researchers New Tool of Advanced Design

◆ A coke oven of pilot-plant size is small enough to be practical for multiple testing, yet it has many characteristics of a full-scale model . . . To coke producers, it should prove a useful research tool . . . Designed after a prototype, many modifications have been added for convenience and greater validity in results.

By JOHN MITCHELL, Research Director,
Eastern Gas and Fuel Associates, Boston



SMALL COKE OVEN, with many innovations, has many characteristics of a full-scale model.

◆ A PILOT-PLANT COKE OVEN of advanced design, which will carbonize ¼ ton of coal, may well be the research tool of the future for studying the properties of cokes made from particular blends of coals. This oven, recently built and put to use at the Research Laboratory of Eastern Gas and Fuel Associates, Everett, Mass., follows the basic design of a prototype.* However, through the cooperation of other workers in this field, it incorporates many modifications which contribute to convenient operation and valid results.

It may seem strange that a primary testing tool for coal carbonization should require 500 lb. of coal. Yet, this size factor is important because the nature of cokes depends very much on the form and size of the modern byproduct coke oven.

Temperatures in a full-scale oven charged with coal vary in a complex way from moment to moment. Gases are continually given off in two vertical plastic seams which move slowly, but not uniformly, until they coalesce in the median line of the oven. Pressures exerted by escaping gases on the plastic masses play an important role in coke formation.

Experience has shown that cokes made in test apparatus do not correlate well with plant practice unless the apparatus has many of the characteristics of a full-scale model. Pilot yield ovens retain enough of these characteristics to give useful and valid results, yet are small enough to be practical for multiple testing.

A method of operation can be selected for a pilot oven so that the physical characteristics of the cokes will have a known correlation with

*Reed, F. H., Jackman, H. W., and Henline, P. W., Ind. Eng. Chem. 37, 560-566 (1945).

practice in specific full-scale ovens. The correlations are good enough so that decisions of acceptance or rejection of particular charges can be made and at relatively small expense.

The final criterion is the quality of coke made in a full-scale oven. Even the most promising mixes must eventually be tested in this way. Nevertheless it will be certain that the "experiment" will not damage ovens, will not introduce unknown heating problems, and will produce coke of good quality.

The design of the oven chamber and the surrounding brickwork is closely patterned after the prototype. The floor and side walls are of 2-in. thick carborundum tile, forming an oven chamber 13½ in. wide, 36 in. long and 35 in. high. Since monolithic side wall tiles tend to crack badly, each side wall in the current design is made of two pieces, the joint being tongue-and-groove and horizontal.

Ends of the coking chamber are closed by doors mounted from hinges on buckstays, an innovation introduced by Jones & Laughlin Steel Corp. Although brick is sometimes used for door plugs, casting both the plugs and the arch was preferred. Fractocrete is used for the former, and a mixture of Lumnite cement and Haydite aggregate for the latter. Mechanical perfection in hinge construction and alignment is desirable to insure that doors work smoothly.

Doors are sealed by a lute of Johns-Manville 450 asbestos cement and water. During operation, a very slight positive gas pressure should be maintained in the oven. Gas is vented through a short pipe and burned under a bell connected to a chimney of 8-in. pipe provided with a damper.

Twelve AT-type Globars, with a 67-in. length, 1¼ in. diam, and a 36-in. long heating section, supply the heat. The special Globar brick should have 2-in. diam holes. The Globars are centered by light packing with Fiberfrax.

Twelve thermocouples are furnished for measuring flue temperatures. A thermocouple well is also located immediately under the carborundum floor tile. All thermocouple wells are of ½-in., type 304 stainless steel pipe. One door is fitted with 17 wells projecting through the plug, and the other has six. One well is for inserting a steel tube connected to a mercury manometer to measure gas pressure developed in the plastic seam.

The oven proper is capped with a steel platform readily accessible from the floor. Oven top operations such as charging, sealing off, and adjusting of dampers, are greatly facilitated.

An innovation is a demountable outrigger used in the leveling operation. This is essentially a guide to insure that the leveling bar is moved in an exactly predetermined plane. Precise leveling becomes easy and makes it possible to determine accurate bulk densities. Charging is done from a hopper elevated by an electric hoist.

A hand-operated pusher machine, patterned after a design by Jones & Laughlin Steel Corp., discharges the coke into a steel hot car. The hot coke is quenched under controlled conditions so that physical properties may be determined without further drying.

Instrumentation consists essentially of an L&N program controller, and two recording Speedomax units. The program controller allows wide choice of temperature levels and coking times. Gages of suitable range measure gas pressures in the free space as well as those developed in the plastic seams.

Good correlation exists between plastic seam gas pressures and the pressure exerted by a charge on oven walls. All mixes are screened for safety before trial in the yield oven. A routine measurement of gas pressure provides further data with which to explore the quantitative validity of the correlation.

For the time being it has been decided to dispense with a by-product train. It is believed that results of adequate accuracy can be obtained by bench-scale methods and that the possible improvement in accuracy does not justify the considerable additional expense and manpower.

Eastern Gas & Fuel Associates will use this oven to continue its study of the effects of variations in charge composition and of operating variables on the quality of coke. A comprehensive study has been undertaken to include all the coals mined and sold by the Association. With this information at hand, coals, mixes, and operating variables can be quickly chosen—and with a minimum of spot testing—to produce cokes of any desired properties.

HAND-OPERATED PUSHER discharges load of coke into steel hot car after carbonization.

BOOKKEEPING MACHINE posts figures on inventory record. Pressing bar gives new balance.

SHIPPING COPIES are filed in 126-division sorter prior to posting in bookkeeping machine.

In steel warehouses—

Management Gets More Profit From Inventory Investment BY BETTER CONTROL SYSTEM

◆ Money invested in inventory is money which can earn a profit . . . Being out of stock means lost sales . . . Carrying too much stock is costly, space consuming, and may require selling at a loss.

◆ Management's tool for good control is an effective, up-to-date inventory system . . . It permits getting the right merchandise in the right quantity at the right time and at the right price.

By RICHARD NEUMAIER,
Systems Analyst and Consultant, Philadelphia

◆ AS A MANAGEMENT TOOL, a correct and up-to-date inventory control system can insure that needed items are available in sufficient quantity at the right time and the right price. Such a system fully recognizes the dictionary definition of the word "control": "To exercise a directing, restraining or governing influence."

Unfortunately the inventory record is too often merely a historical one. It frequently lacks accuracy and in many cases is posted too late to be of much use to management as a "governing influence."

Seeking to improve its own inventory management, the Horace T. Potts Co., a steel warehousing organization in Philadelphia, Baltimore, and York, Pa., surveyed the inventory procedures of similar firms. Nine warehouses were actually visited and a number of four-page questionnaires were sent to other companies.

Thirty nine questionnaires were returned with detailed information which was tabulated. The answers had very little in common, indicating that as long as sales policies, investment and warehouse facilities vary, an inventory program must be custom built for each company's requirements.

Answers to the questionnaires listed 21 different ways to record receipts of merchandise and 17 different ways to record sales. Thirty six companies posted their records by hand, six kept

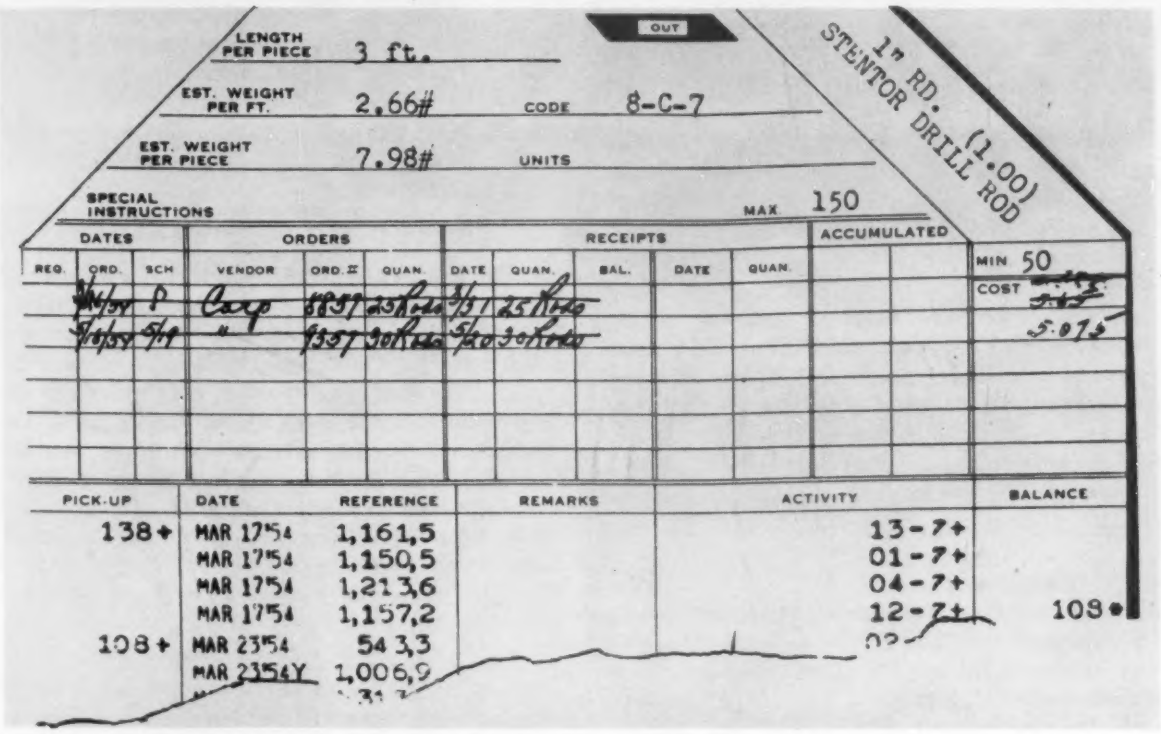
these records in books, and 30 firms used ledger cards kept in tub or visible record files. Only three of the warehouses used mechanized posting.

Answers covering sales record keeping varied from records posted from sales orders to loading reports posted from memo orders prior to formal billing. One warehouse posted sales to its inventory records by night shift operation of a bookkeeping machine. Another warehouse prepared a separate sales report on tabulating equipment, doing its own key-punching but using the equipment makers service bureau for report preparation. The third machine installation prepared a complete sales report.

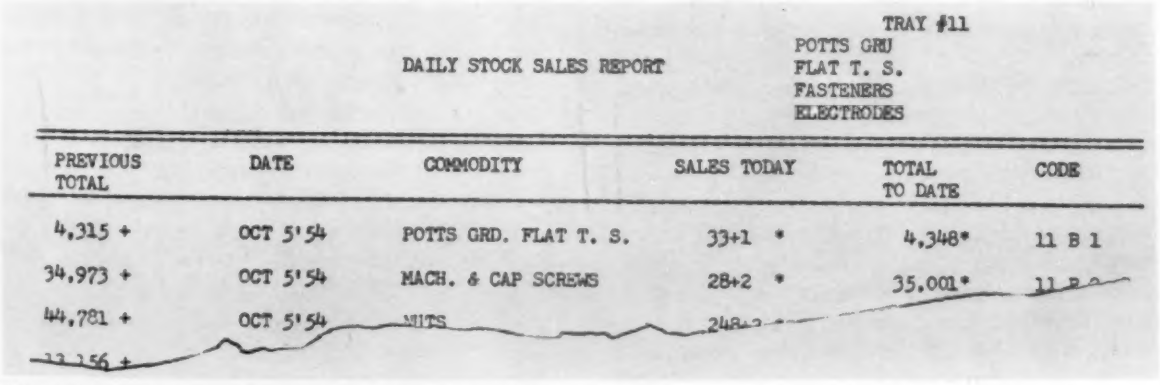
At the time the survey was made, the Potts Co. was using an outside service to prepare a peg strip sales analysis from bill copies. The peg strips were summarized by customers, salesmen and territories, and listed 45 commodities according to value and weight.

Since the survey of sales reporting procedures showed no "one best way," it was clear that a new, specifically designed inventory system was needed. Certain basic records were necessary for the posting of tonnage or units. These included the accumulation of daily receipts and shipments of merchandise in 126 classifications, and the posting of receipts and shipments to 7000 individual item inventory record cards.

Other records were needed to indicate inventories below required minimum balances, to provide details for evaluating the average price of merchandise on hand, and to supply details for calculating the inventory for accounting pur-



INVENTORY RECORD gives an up-to-date story on what's on hand and what's needed.


DAILY STOCK SALES REPORT
TRAY #11
POTTS GRU
FLAT T. S.
FASTENERS
ELECTRODES
PREVIOUS TOTAL DATE COMMODITY SALES TODAY TOTAL TO DATE CODE
4,315 + OCT 5'54 POTTS GRD. FLAT T. S. 33+1 * 4,348* 11 B 1
34,973 + OCT 5'54 MACH. & CAP SCREWS 28+2 * 35,001* 11 B 2
44,781 + OCT 5'54 NUTS

BYPRODUCT of inventory system is report on daily sales volume and accumulated totals.

poses. Additional basic records would (1) permit reconciliation of physical and recorded inventory on a cycle basis, (2) allow the purchasing department to buy required and related items on one mill order, (3) provide accumulated sales data, (4) show a past purchasing record, and (5) provide a back order record for unfilled orders.

In addition to the basic records requirement it was desirable to have all posting completed within 24 hours of shipment, and have all warehouse orders shipped within 24 hours of receipt of orders.

The new program did not start within the inventory group. An 11-part snapout form for both order writing and billing was redesigned to provide enough copies in one unit for the shipping department.

This shipping department unit consists of (1) a billing copy with the exact weight of shipment, (2) an inventory copy, (3) a trucker's copy, (4) consignee's copy, (5) and a control copy.

In actual practice, most orders are typed as soon as the credit department approves the shipment. The shipping section of the order is separated and sent via pneumatic tube to the shipping section of the order and filed alphabetically. The remaining four-part section is sent to the warehouse.

Picked orders are weighed, and the weight entered on the four-part unit. Copies are separated at once. Part one is sent to the shipping office, matched with the control copy, and forwarded to the billing department. Part two is sent directly to the inventory department. Parts three and four are used in the shipping operation.

Operation is basically simple

In the inventory department, cards are filed in 18 related commodity groups in each of seven visible record trays with about 1000 inventory record cards to the tray.

A 126-division sorter sorts out the posting media for both receipts and shipments. Sales orders are typed in the sequence of the 126 commodities and the alphabetic sequence of the items to accommodate sorting of items in multiline orders by their first posting entry. Subsequent items are resorted for the exhaust method of posting.

Posting is done on a bookkeeping machine, with 19 registers. One register provides the new balance, and the other 18 registers accumulate the sales of the 18 commodities of the individual trays.

The operation in itself is very simple. It consists of picking up the old balance, indexing the sales order number, automatic printing of the date, indexing the quantity received or withdrawn, and selecting the commodity group identifying key. Pressing the motor bar gives the new balance. The machine automatically opens the carriage and positions it for the next posting.

If a new balance is below the required minimum, the posting clerk attaches a signal to the item inventory record card for the purchasing department.

The machine also automatically provides a subtotal of sales. A sales analysis form inserted into the machine is posted as a carbon in clearing the totals in each commodity register onto the control cards.

Automatically gives sales total

In addition to the sales report, inventory posting furnishes within 24 hours after shipping a record of items which reached minimum reorder balances. The commodity sales analysis supplies statistical data on groups of related items.

An analysis of warehouse sales, branch warehouse sales and direct shipment sales, together with a sales tax analysis is prepared as a by-product of the accounts receivable posting operation. The debit posted amount is automatically repeated in distribution columns and accumulated. This requires no extra effort and provides sales volume figures for daily totals and their accumulated totals.

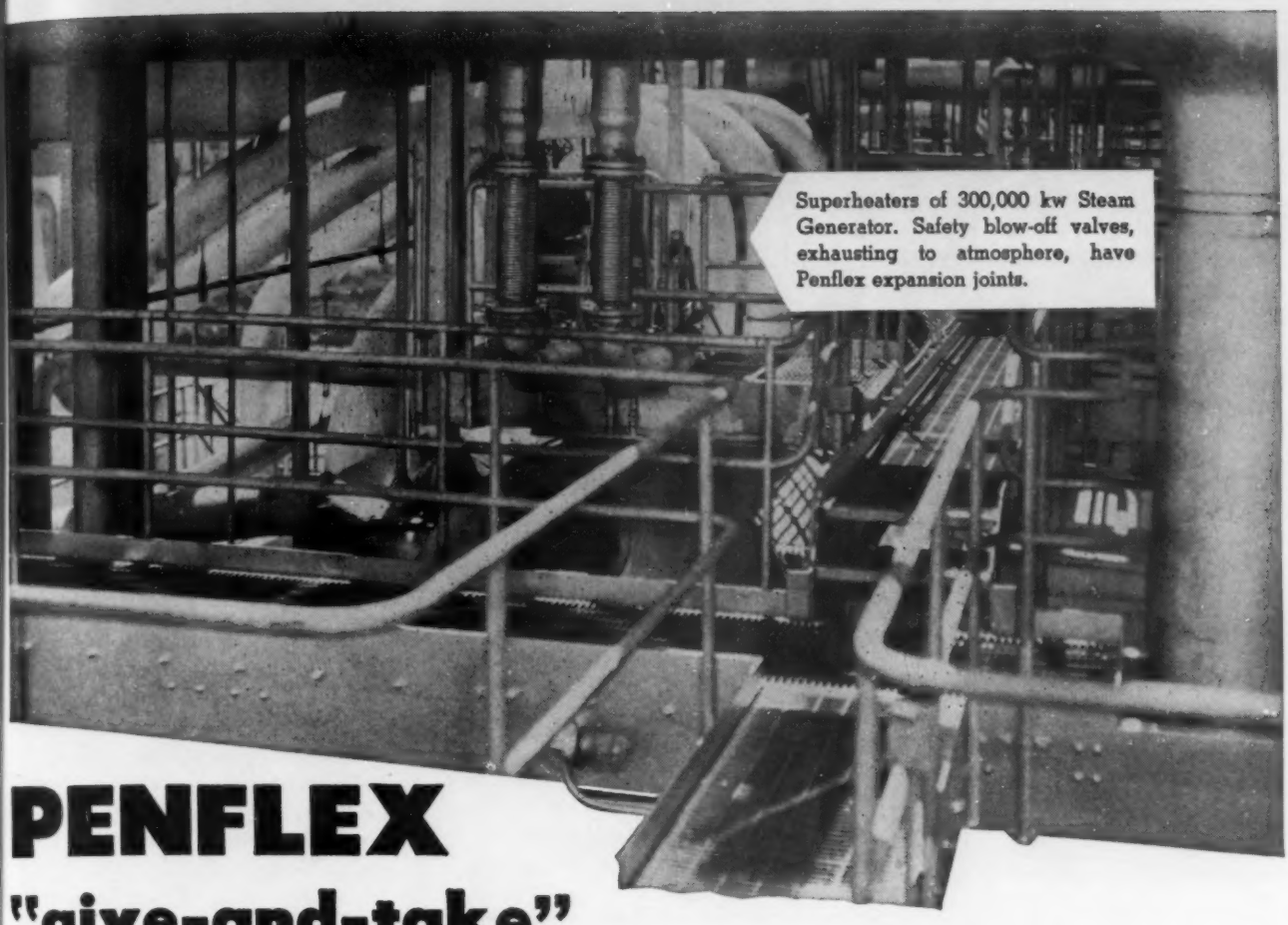
Inventory valuation procedure simplified

The end of the month peg strip sales analysis has been simplified to a dollar value analysis only. It covers the same 45 classifications provided for in the original value and volume report. The tonnage report is obtained from the inventory control operation on a daily basis. The calculation of the average cost price and the extending of the inventory values are still performed manually with the help of an electric calculator. New inventory cards and the checking of the inventory on a cycle basis has made it possible to prepare inventory valuation in one-third the time.

The purchasing department has greatly improved its ability to buy the right merchandise at the right time and at the right price. With rising distributing costs, smaller spread between cost and selling price, it becomes more important for the purchasing agent to combine items into the most economical purchasing quantities also considering freight rates. Grouping of commodities, with minimum quantities and balances shown on the visible margin, permits a fast review of items to be purchased.

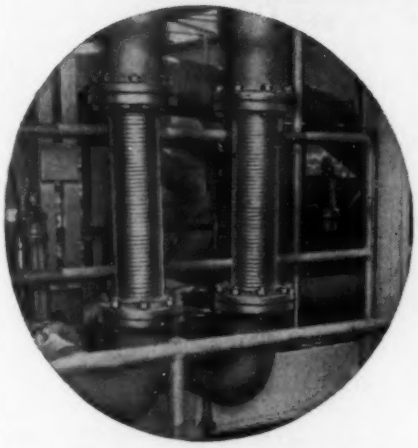
Use of the visible record trays is highly advantageous in furnishing quick information of stock on hand to the sales department. Posted stock reflects the warehouse's stock minus one day's shipments. With an average inventory of a 70- to 90-day stock, such information is satisfactory.

There are exceptions, such as unusually low stock or inquiries for more than the normal sales of an item. However, these exceptions are so infrequent that such orders or inquiries can be handled easily.



Superheaters of 300,000 kw Steam Generator. Safety blow-off valves, exhausting to atmosphere, have Penflex expansion joints.

PENFLEX "give-and-take" prevents blow-outs on blow-offs



Penflex Galvanized Steel Interlocked Tubing (8" I.D.), flanged at both ends. Installed as expansion joints on safety blow-off valves, they take up to 850 psi steam pressure at 900°F.

Power plant applications like this one can't use less than Penflex Metal Tubing offers in flexibility, strength, and tightness. When safety valves go, expansion joints must hold. Penflex joints *do*. That's because they can give with the pressure and take it, too.

Thermal expansion at 900°F. . . . pressures up to 850 psi . . . impact and pipe movement under these strains—all are safely handled by Penflex. Forty-two complete units in this big power plant are protected from blow-outs by Penflex.

There are hundreds of other applications in the steam and diesel power fields for Penflex Interlocked Tubing and Penflexweld High-pressure Tubing. Call in the Penflex engineer to help you on your own particular problems. In the meantime, write for "Flexineering," your guide in buying and using Penflex Flexible Metal Tubing. There is no charge or obligation.

Pennsylvania Flexible Metallic Tubing Company, Inc., 7210 Powers Lane, Phila. 42, Pa.
Branch Sales Offices: **Boston • New York • Chicago • Houston • Cleveland • Los Angeles and Distributors in Principal Cities**

COMBINES FLEXIBILITY WITH DURABILITY

FREE AIDS

New Technical Literature:

FOR YOUR COPY

Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, page 135.

Height gage

The Chesterman height gage is the topic of this new booklet. Stressed is the fact that these gauges are stabilized and easy-reading. Among advantages listed are economy of time and labor, quick approximate adjustment, and fine adjustment. Features include sliding head, extra large verniers, triangular scale beam, and large solid base. Specifications are included. *George Scherr Co., Inc.*

For free copy circle No. 1 on postcard, p. 135.

Mirror polisher

The Nicholas double roll mirror polisher is covered in this new leaflet. This machine is suitable for all types of glazing, polishing and buffing on flat work from pocket knife blades up to pieces 14 in. in length, according to the leaflet. Features include an automatic pressure release and extra wide working surfaces. Specifications are included. *Nicholas Equipment Co.*

For free copy circle No. 2 on postcard, p. 135.

Spot welders

The new design of a standard, air operated, press type, Sciaky three-phase SPT 2 and EPT 2 spot and projection welder is announced in this new bulletin. The SPT 2 will make high quality welds on large production runs on a wide range of metals and alloys to commercial standards. Complete specifications are included. *Sciaky Bros., Inc.*

For free copy circle No. 3 on postcard, p. 135.

Equipment

Microhoning and microflat equipment is covered in this new catalog. The advantages of microhoning and the microhoning formula are discussed. Cylindrical microhoning equipment, microsize, tools, fixtures, abrasives and services are also covered. Finishing flat surfaces is described. *Micromatic Hone Corp.*

For free copy circle No. 4 on postcard, p. 135.

Glossary of terms

More than 150 technical terms applying to ferrous and non-ferrous castings are given in this glossary. This glossary may be of use to designers, machinists and purchasers of castings. *International Nickel Co., Inc.*

For free copy circle No. 5 on postcard, p. 135.

Catalogs & Bulletins

Blast cleaning

The models of Continuous-Flo Roto-blast barrels available for production line blast cleaning are covered in this new bulletin. Among the advantages listed are economy, increase in work cleaned, reduced loading and unloading times, and elimination of manual handling. Emphasized is the fact that these machines handle a continuous flow of work. *Pangborn Corp.*

For free copy circle No. 6 on postcard, p. 135.

Amplifier system

The 20-KC Carrier Amplifier System is discussed in this new leaflet. Applications and sensitivity are discussed. The system is shown and described in detail. Specifications are given. *Consolidated Engineering Corp.*

For free copy circle No. 7 on postcard, p. 135.

Turnings crusher

The American metal turnings crusher is discussed in this bulletin. Data sheets give capacities, horsepowers, crusher dimensions, etc. Mechanical drawings and construction features are included. Case histories are cited. A typical chip salvage system is shown. The efficiency and economy of these crushers are emphasized. *American Pulverizer Co.*

For free copy circle No. 8 on postcard, p. 135.

New attachment

A new fast-scanning recording attachment for the Beckman DU Spectrophotometer is the topic of this booklet. The new accessory combines the double beam principle with single photoreceiver and amplifier. The attachment uses a high-frequency beam chopper and switching system. Advantages include freedom from drift and line variation, and the avoidance of problems of phototube matching and aging. *Beckman Div., Beckman Instruments, Inc.*

For free copy circle No. 9 on postcard, p. 135.

Turn Page

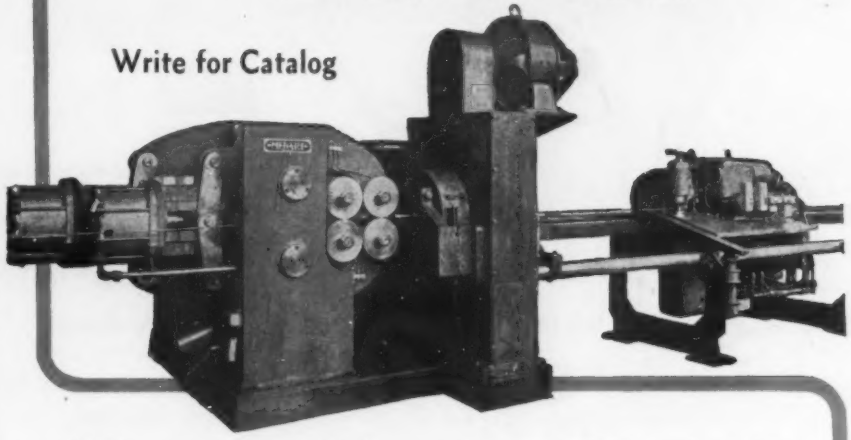
Increase Output
3 to 4 Times Or More
On Bar & Tube Turning!

MEDART

RFPD AUTOMATIC
CENTERLESS BAR TURNERS

FOR BARS ¼" to 6" DIAMETER

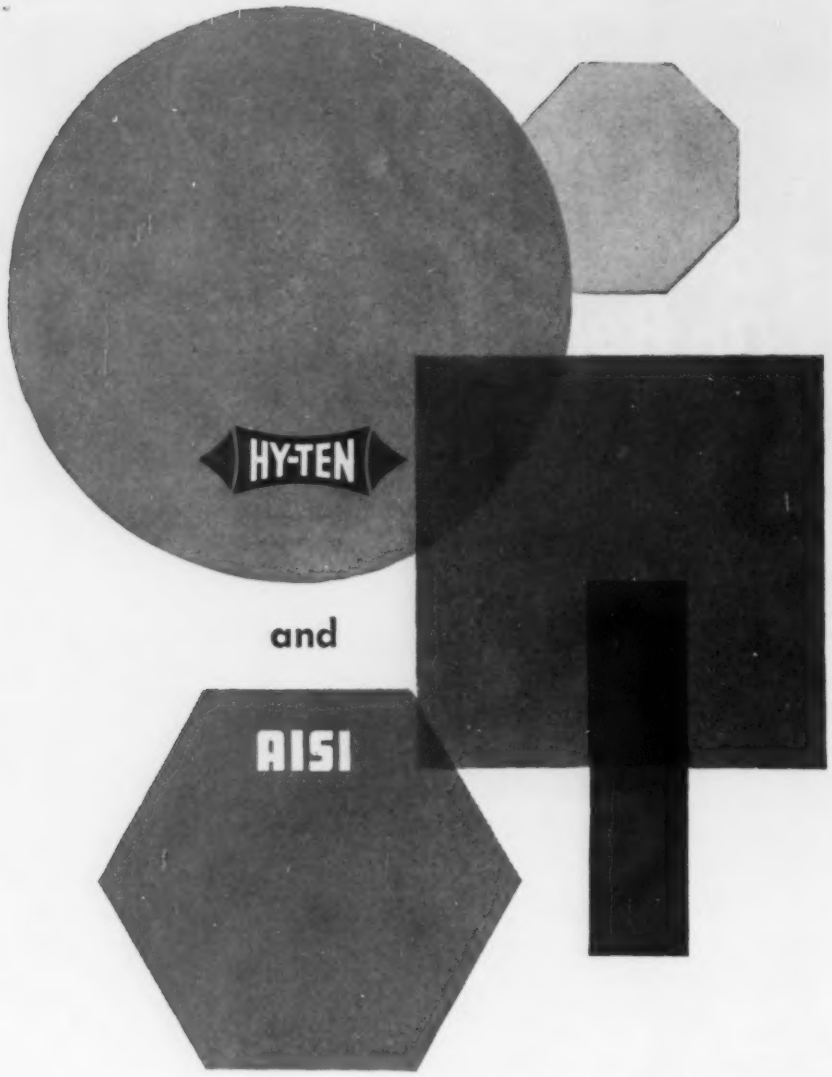
Write for Catalog



- The unsurpassed production speeds of the RFPD Turner using carbide cutting tools—up to 12 ft. per minute—average from 3 to 4 times that of conventional turners by actual comparison.
- Material turned on this machine can be sold directly from the machine for "as turned" stock, put through the Medart two-roll rotary straightening, sizing and polishing machines for "turned and polished" stock, or given one pass through a centerless grinder for "ground" stock.
- The RFPD turning gives 100% material recovery with short, easy-to-handle chips.
- Direct-drive cutterhead, through single V-belt drive, is a single compact unit designed for either brazed tip or mechanically held carbide tools.
- Controls provide fully automatic push-button operation through entire cycle, and supplementary manual operation for setup. Both speeds and feeds are infinitely variable.

CONTINENTAL FOUNDRY & MACHINE CO.

220 GRANT STREET PITTSBURGH 19, PA.



bars, billets and forgings
in sizes, shapes and treatments for every need!

Wheelock, Lovejoy & Company, Inc., can fill your alloy steel requirements promptly. This applies to both standard AISI and SAE steels and to our own HY-TEN steels—"the standard steels of tomorrow". Take advantage of our seven strategically located warehouses. All of them can supply these steels in the form and quantity you need. Every warehouse, too, is staffed with expert metallurgists who are ready to serve you.

Write today for your FREE copies of Wheelock, Lovejoy Data Sheets. They contain complete technical information on grades, applications, physical properties, tests, heat treating, etc.

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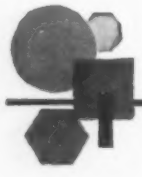

WHEELOCK, LOVEJOY & COMPANY, INC.
126 Sidney Street, Cambridge 39, Mass.

FREE TECHNICAL LITERATURE

Chempac materials

Chempac packings and gaskets are discussed in this new folder. These materials are virtually unaffected by corrosive chemicals and active solvents, according to the folder. They are made of treated asbestos, and are especially designed for chemical and process equipment. Several types are covered, including packings in coil, spiral and ring forms. *Johns-Manville.*

For free copy circle No. 10 on postcard, p. 135.

Pressure filters

Vertical leaf pressure filters for solution clarification are the subject of this new brochure. With either intermittent or continuous operation these filters may be used in electroplating, electroforming, nickel dip solutions and neutralizer solutions. Among advantages listed are low filtration cost, air cleaner, top performance, and great capacity. Specifications are given. *Industrial Filter & Pump Mfg. Co.*

For free copy circle No. 11 on postcard, p. 135.

Casting materials

HYSOL epoxy casting materials for tooling are covered in this new technical bulletin. Epoxy type casting resins are outlined, along with techniques for casting all types of tools. *Houghton Laboratories, Inc.*

For free copy circle No. 12 on postcard, p. 135.

Expanding mandrels

The Le Count Tool Works, Inc., line of precision Universal Expanding Mandrels is the topic of this folder. The folder covers both the Type "A" and Type "S" expanding mandrels. Special mandrels are also covered. *Le Count Tool Works, Inc.*

For free copy circle No. 13 on postcard, p. 135.

Solder

Solder, its fundamentals and its usage, are discussed in this new textbook. This is a scientific study of the industrial application and usage of solder. Charts, tables and photographs give additional information. *Kester Solder Co.*

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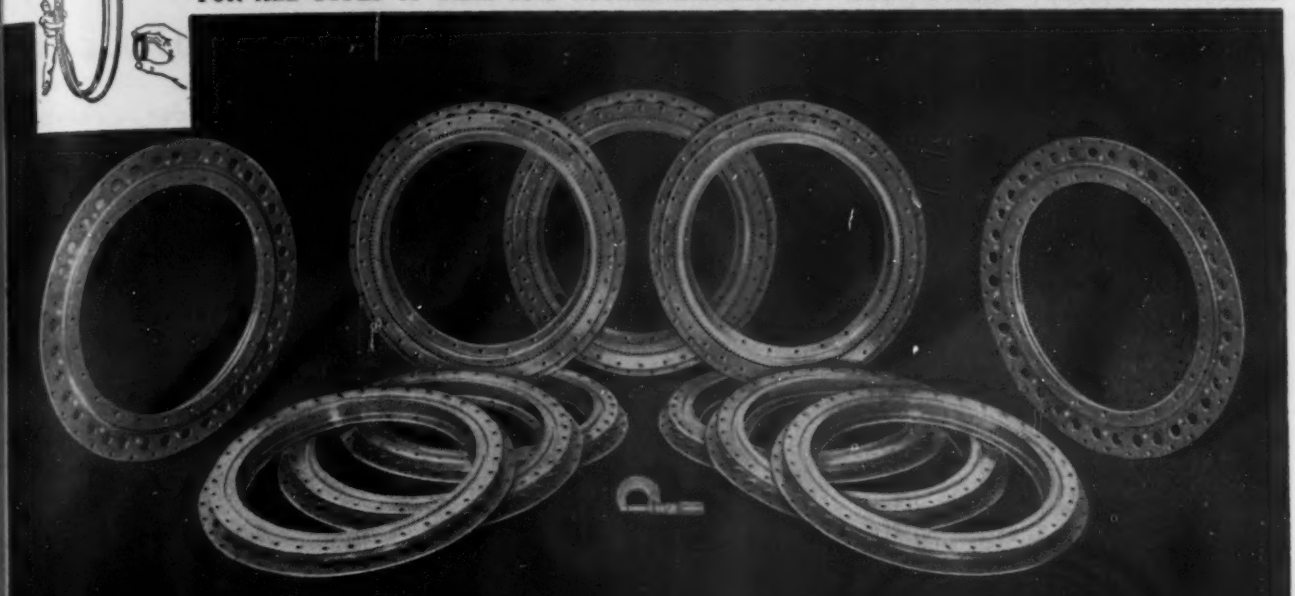
Turn Page

Contact KAYDON Muskegon

FOR ALL TYPES OF BALL AND ROLLER BEARINGS: 4" BORE TO 120" OUTSIDE DIAMETER



Double-row radial ball bearings
11.375" x 16.000" x 1.062"

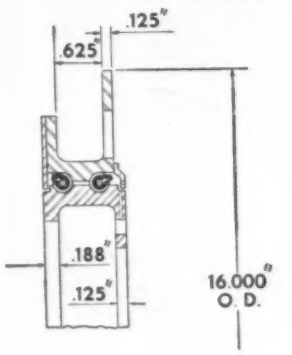
Pattern for precision...and profit

Make it standard procedure to contact Kaydon for Reali-Slim bearings

Ultra-precise lightweight bearings that perform to exceptionally high standards, yet require minimum space are KAYDON's specialty. Today, KAYDON offers you unmatched experience in the design of *Reali-Slim*, thin-section and/or high-precision bearings. Then, too, KAYDON has specially developed production facilities to build these bearings . . . economically . . . on either a custom or volume basis.

Follow the lead of many prominent manufacturers — make it standard practice to consult KAYDON of Muskegon on bearing problems. You'll find it pays in terms of time, money and the performance of your product.

Details of thin section bearing shown above –



Just Out! Get your copy of the new KAYDON Reali-Slim thin bearing catalog No. 54.

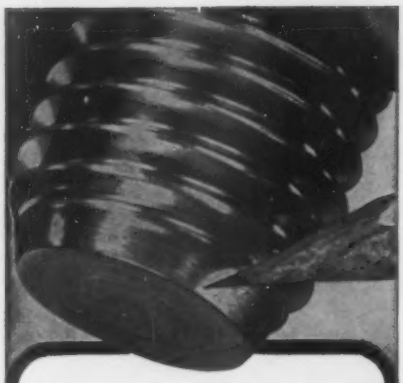
KAYDON Types of Standard and Special Bearings:
Spherical Roller • Taper Roller • Ball Radial • Ball Thrust • Roller Radial • Roller Thrust • Bi-Angular Bearings

THE KAYDON ENGINEERING CORP.

MUSKEGON • MICHIGAN

K545

PRECISION BALL AND ROLLER BEARINGS



TOUGHER!

Allen

LEADER POINT CAP SCREWS

Dropping, knocking against metal surfaces and faulty line-up are major causes of damaged threads. Allen's new unthreaded leader point substantially reduces the causes of screw thread injury, or damage to threaded holes. Grip Heads, precision fit sockets that adhere to the key, *plus* the new leader points, make Allens the world's easiest starting cap screws, particularly in inaccessible spots. Sold *only* thru leading Industrial Distributors.

ALLEN
MANUFACTURING COMPANY
Hartford 2, Connecticut, U.S.A.

DRAWING: Lower Tool Costs

Reverse draw process turns cans inside out . . . Method used successfully for runs of 200 or less . . . Tooling costs are 15 to 25 pct cost for conventional draw dies.

In the reverse draw process the sides of a can are rolled back and forth with each succeeding draw. An example would be turning a stocking inside out. With each succeeding draw the diameter is reduced and the length increased.

For runs of approximately 200 or less, W. J. Jurchisin, methods engineer of Minneapolis-Honeywell Regulator Co., Minneapolis, recently reported that the reverse draw process for cylindrical cans had proved most economical.

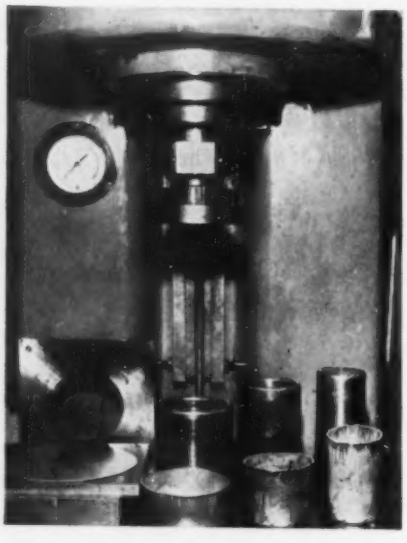
Tooling on the Denison Multipress is very simple and costs between 15 and 25 pct of the cost of conventional draw dies.

Draw Ring Bolted Down

For a 3 draw operation the blank is placed on the lower draw ring and centered. The top draw ring is placed over the blank and bolted down. This is then centered under the ram of the press and the first draw die is placed into the top draw ring. The ram comes down and forms the first draw.

The punch and part assembly is inverted 180° and the draw rings removed. The second punch is then placed on top of the drawn part still covering the first punch. As the ram is brought down the part is turned inside out. The sides of the can move up the first punch and down over the second punch until the first punch is stripped of the part.

This type of operation has only been performed on 2-SO aluminum and there have been cases where 5 draws were achieved without annealing. Generally, annealing is required after three draws.



Reverse draw tooling . . .

WANT MORE DATA?

You may secure additional information on any item briefed in this section by using the reply card on page 135. Just indicate the page on which it appears. Be sure to note exactly the information wanted.

Standards:

Study effect of tap-drill size on strength of tapped hole.

New, nonstandard tap-drill sizes were suggested as a possible solution to the problem of obtaining maximum strength in screw-threaded fastenings with less tap breakage, at the recent annual meeting of the American Society of Mechanical Engineers in New York.

Studies made at National Twist Drill and Tool Co., Rochester, Mich., and National Machine Products Co., Utica, Mich., have shown that for threaded assemblies of usual proportions maximum

strength is developed with 50 pct of thread height. Exact tap-drill size is relatively unimportant when the percentage of thread height is greater than 60 pct. Tapping costs were found likely to be lower if the lowest possible percentage of thread height is used.

Melting:

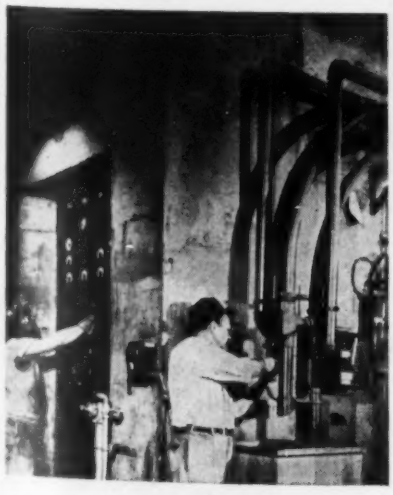
Fast sample transmission increases furnace output.

Pneumatic delivery tubes connecting the melt shop with the laboratory have increased melting capacity at one steel plant without the use of additional melting equipment.

The output of two 25-ton electric furnaces at Cameron Iron Works in Houston, Texas, has been increased from 4 melts to 6 melts a day by adopting a faster system for transmitting samples and reports between the melt shop and the laboratory.

This firm operates a number of different buildings in connection with its operations. One group of buildings is occupied by the Forge and Ordnance Dept., which specializes in the manufacture of large, intricate forgings for oil field equipment.

The nature of the special forging process used, and the severe service requirements of the completed forgings require extremely close control during melting of an average heat. To maintain this control the steel is sampled and analyzed eight times per heat on the firm's spec-



Insert hot test sample . . .

OUT OUR WAY

NOW YOU CAN GET BACK TO THE JOB, CHARLEY-- IT WON'T HAPPEN AGAIN! I GOT SOL-SPEEDI-DRI ON THE FLOOR! MEN LIKE YOU ARE THE BACKBONE OF THE SHOP!
THE BULL'S GOT HIS NERVE! I DOUBT THAT CHARLEY'S GOT A BACKBONE LEFT AFTER THE SPILLS HE'S TAKEN!
YEAH--THE SOLID FOOTING WILL BE THE END OF CHARLEY! HE'S TOO OLD TO CHANGE HIS WAYS!
THE OLD PRO
J R WILLIAMS

Best value—best seller!

SOL·SPEEDI·DRI

For keeping floors spanking clean — absolutely slip-proof — Sol-Speedi-Dri is way ahead of other industrial oil and grease absorbents. Proof? Industry buys more of it than any similar product. And here's why . . . it spreads fast, covers plenty of ground, "dry-cleans" thoroughly. You can count on consistent quality, too — careful laboratory controls insure that. Why not try it yourself? Send coupon today for free sample.

SPEEDI-DRI CORP. 210 W. Washington Sq., Philadelphia 5, Pa.

Warehouse stocks maintained in principal cities of the United States and Canada.

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Inquirers in New York, New England, and New Jersey should write to Speedi-Dri Corp. Elsewhere in U.S. to Waverly Petroleum Products Co., 1724 Chestnut St., Phila. 3, Pa. In Canada, G. H. Wood & Company Ltd., Toronto. Branches throughout Canada.

FREE SAMPLE Fill out the coupon and mail today for free sample and literature.

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IA-12/2

with the
RANSBURG NO. 2 PROCESS
Paint mileage jumps
84%
in the finishing of
G-E AUTOMATIC WASHERS

...and **74%** in
finishing G-E DRYERS

Production is increased and quality of the work is improved over former hand spray method

● When General Electric formerly hand sprayed their home laundry equipment—automatic washers and dryers—they painted 9.74 washers with a gallon of paint. Now, in the new and modern plant at Appliance Park, Louisville—where they're using the Ransburg No. 2 Process—they get 17.97 units per gallon of paint. An increase of 84%!

And, where they formerly got 5.49 dryers per mixed gallon of finish, now—with the Ransburg No. 2 Electrostatic Spray Process—they get 9.56 dryers per gallon of paint. An increase of 74%!

Along with increased production, G.E. is getting a more uniform, higher quality finish. Another typical, on-the-job-example of the unmatched efficiencies of the Ransburg No. 2 Process of electrostatic spray painting!

Want to know what Ransburg Electrostatic Processes can do for you in your finishing department? Ask about the complete facilities for test-painting YOUR products—under simulated production conditions—in Ransburg laboratories.

Ransburg ELECTRO-COATING CORP.
Indianapolis 7, Indiana
RANSBURG

trographic laboratory equipment.

The melt shop is located nearly half a mile from the laboratory where the analyses are performed. Formerly a messenger carried the sample to the laboratory, waited for the analysis to be completed, then returned with the analytical report to the shop, where the melt supervisor made the required changes in the melt.

Trip Time Cut

Although each analysis required 10 minutes, 20 additional minutes were spent in making each of the round trips between furnaces and laboratory. This meant that, although an average heat required about 4 hours of actual process time, the production time for each batch of steel was increased by about 2.7 hours because of the messenger's travel time.

Cameron has reduced this excessive processing time by using a more efficient method to transmit the samples and reports. To cut this time, pneumatic tube lines were installed from the melt shop to the laboratory.

Line Runs 2000 Ft

Manufactured and installed by Lamson Corp., Syracuse, N. Y., the Airtube system consists of a pair of 3-in. lines running the 2000-ft distance between the melt shop and the laboratory. Parts of the lines are underground, and other sections high on the superstructure of the intervening buildings. A Lamson Billmyre exhauster at each end of the system creates a powerful airstream that drives the cylindrical carriers through the tubes at an estimated 56 mph.

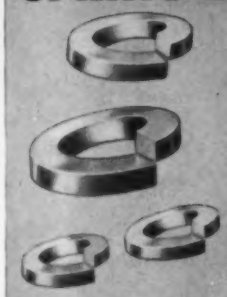
Carries Hot Samples

The hot steel samples are poured into a special hollow block which is inserted into the carrier and sent through the tube line to the laboratory. There the steel sample is analyzed on a Baird direct-reading 12-element spectrometer, the results recorded, and the analytical report returned through the Airtube to the melt supervisor at the furnaces. The completed analysis is received about 12 minutes after the sample is sent.

YOU CAN'T BEAT GARRETT for SMALL PARTS and SERVICES

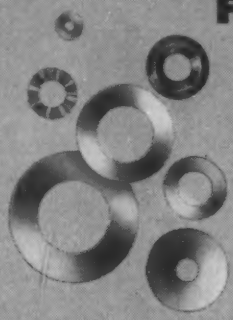
Whether they are small or medium size parts to regular specifications or special sizes and finishes . . . Garrett can give you quick deliveries. Garrett's stock of billions of parts make most deliveries possible from stock. Garrett's three modern plants equipped with the most up-to-date, precision automatic machines provide the fastest service on parts to your special specifications.

SPRING LOCK WASHERS



Complete line of high quality spring lock washers to ASA and SAE specifications, plus many special types . . . wide choice of metals plated to your requirements.

FLAT WASHERS



Fast delivery from the most complete line of washers in the world. Precision made in thousands of different sizes and types—all standard and many semi-standard sizes. Ready for delivery from stock to you.

HOSE CLAMPS

Aircraft AN 737 Stainless steel radial type. Multi-Clamp (QS100 & AN 748) worm type screw hose clamp. Auto-Seal, the inexpensive high quality hose clamp.

STAMPINGS

Quick deliveries on small and medium stampings made to your specifications on high-speed precision production presses. Finished, tumbled and plated to your specifications.

Write today for the Garrett catalog and technical data on these products.

MANUFACTURED BY

Garrett
OF PHILADELPHIA

GEORGE K. GARRETT COMPANY, INC. PHILA. 34, PA.

Drilling:

Automatic feed, shuttle increase drill press output

Modification of a standard drill press by the addition of an automatic feed device and a shuttle table, has permitted mass production drilling at a cost a great deal less than would be necessary through retooling or purchase of new equipment.

The techniques used by Precision Gears, Inc., Milwaukee, illustrate some of the many ways small machine shop owners can simply and at comparatively little cost adapt small machining tools such as drill presses, and grinders, for special jobs.

Coupling for Outboard Motor

This Company's operation involved drilling and chamfering a cross-hole in a stainless steel splined coupling for an outboard motor. A 60 piece per hr output was being obtained by using a hand-fed vertical drill press for the drilling and then transferring the piece to another machine for chamfering. This hand feeding and double handling of the piece were two important reasons for the low output rate.

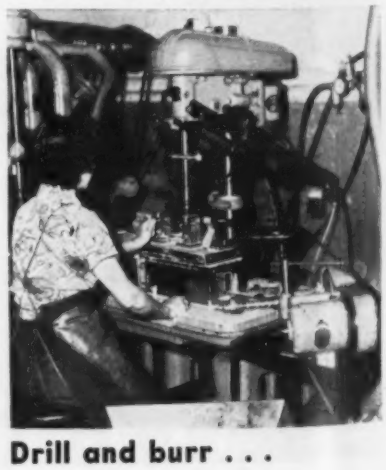
This production rate was satisfactory for a time but, requirements increased drastically, and because of the highly competitive nature of its product, the customer requested that Precision Gears do everything possible to reduce the price of the part. To accomplish this the modified drill press was installed in the Precision Gears plant.

A Bellows automatic feed device with Hydracheck was attached to the Delta 17" press to permit automatic approach and retraction of the drill head. At the same time a simple shuttle table, with two fixtures, was substituted for the drill press table and electrically wired to coincide with the movement of the drill head.

Chamfering was accomplished on a 14" Delta drill press head laid on its side close to the shuttle table.

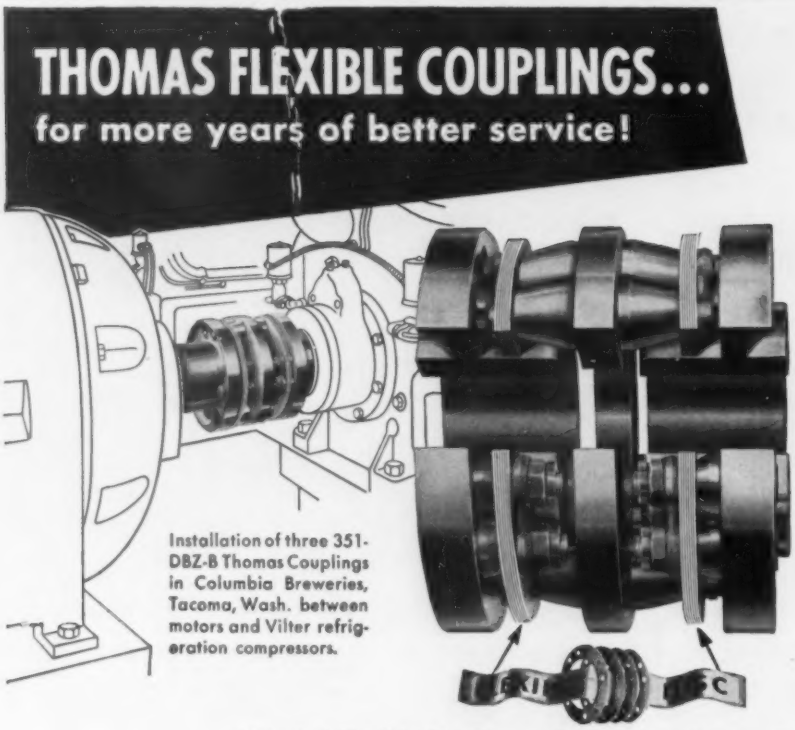
Slides Over Stud

To begin operations an operator slides the piece over a stud on one of the two fixtures and flips a tapered swing clamp to prevent the piece from coming off the stud. The stud is keyed to prevent the splined piece from turning. When the start-button is pushed the shuttle table moves rapidly sidewards to bring the fixture holding the piece directly under the drill head. The drill head automatically approaches, drills a cross hole in the shaft of the coupling, and retracts.



Drill and burr . . .

THOMAS FLEXIBLE COUPLINGS...
for more years of better service!

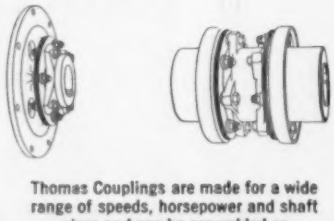


Installation of three 351-DBZ-B Thomas Couplings in Columbia Breweries, Tacoma, Wash. between motors and Vilter refrigeration compressors.

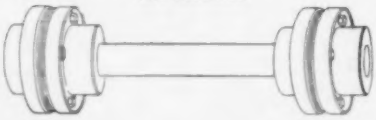
Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

DISTINCTIVE ADVANTAGES

FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Thomas Couplings are made for a wide range of speeds, horsepower and shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.



THOMAS

Write for our new Engineering Catalog No. 51A

THOMAS FLEXIBLE COUPLING COMPANY
Largest Exclusive Coupling Manufacturer in the World
WARREN, PENNSYLVANIA, U.S.A.

When retraction is complete the shuttle table automatically shifts so that the second fixture is positioned under the drill head. While the drilling operation is repeated, the operator removes the finished piece from the first fixture, loads a new piece, then chamfers the finished piece on the adjacent reclining drill head.

Currently production is at a rate of 350 drilled and chamfered pieces per hour. Also several other quantity jobs are being handled effectively by the special machine.

Automation

Unusual setup reduces production line downtime.

One of the big problems facing industry in the application of automation to large groups of metalworking machinery is—What to do when *one* machine breaks down? Often, where no provisions have been made for banking of parts, it may be necessary to bring the line to a complete halt.

This and other problems involving reductions in downtime have been solved with an unusual "sectionized automation" developed by the Cross Co. of Detroit. The development is based on the division of a machine into sections to permit shutting down some of the operations without interrupting the production of others.

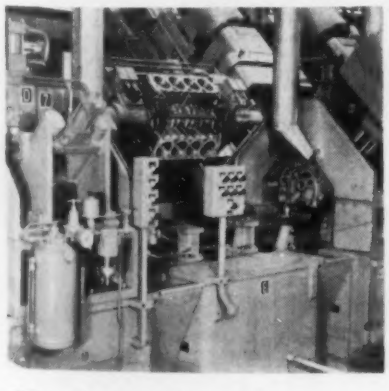
Applied to V-8 Blocks

Sectionized automation has been applied to a new Transfer-matic which is 350 ft long and performs 555 operations on V-8 cylinder blocks. It does all of the drilling, chamfering, tapping, camshaft boring and miscellaneous milling on these parts at the rate of 100 pieces per hour at 100 per cent efficiency.

More than 100 pieces are in process simultaneously. The only direct labor is the operator at Station 1 who positions parts and initiates the cycle by push-button. From there on, the blocks are transferred, positioned, machined and inspected automatically in 104 stations.

The transfer unit is divided into five sections. Because any one section can be shut down while all others remain in automatic operation, a tool change or minor repair can be made in one section while the others continue to produce.

Production in the one section can then catch up during a lunch hour or extra shift, if necessary, since any of the sections can run independently with full automatic cycle.



Checks bank faces . . .

With a Dake Press, lift truck tires can be changed right in your plant

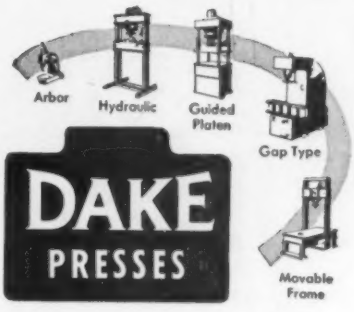
No need to carry an inventory of spare lift truck wheels in different diameters and widths! With a Dake Hydraulic Press you need only tires and rims which can be pressed on and off in your own plant.

This not only means lower investment and reduced service time, but it brings additional savings from being able to buy tires direct from a mill supplier.

The Dake customer pictured above says his Dake Press pays its way on tire service alone . . . and he uses it in addition for many plant maintenance operations — such as pressing in bushings, pressing off frozen sprockets and gears, and straightening plate steel for briquetting presses.

Have you stopped to think what a Dake Hydraulic Press could do for YOU? Send for illustrated Catalog 129.

Dake Engine Company, 602 Seventh St., Grand Haven, Mich.



Send for Big New Catalog

DAKE ENGINE COMPANY
602 Seventh St., Grand Haven, Mich.

Please send me a copy of Dake Catalog No. 129

Name_____

Company_____

Address_____

City_____ Zone____ State_____

Automatic control devices cut the various machine sections in and out . . . Units interlock . . .

An important part of sectionized automation is the Cross Machine Control Unit. Seven of which are placed throughout the machine. These are equipped with special devices which program the operation of all tools.

Interlocked With Machine Cycle

Every time a part is produced, the hands of these Toolometers, which are electrically interlocked with the machine cycle, index counter-clockwise. When one of the hands reaches its zero position, the section of the machine which it governs becomes inoperative. These automatic control devices cut the sections in and out of operation, as needed, for tool changes.

Storage space for two sets of spare tools and tool setting gages for presetting every tool in the machine is provided. Tools are close at hand and ready for use when needed. Preset tools eliminate the lost time normally required for trial cuts and machine adjustment. They also reduce tool breakage due to improper setting.

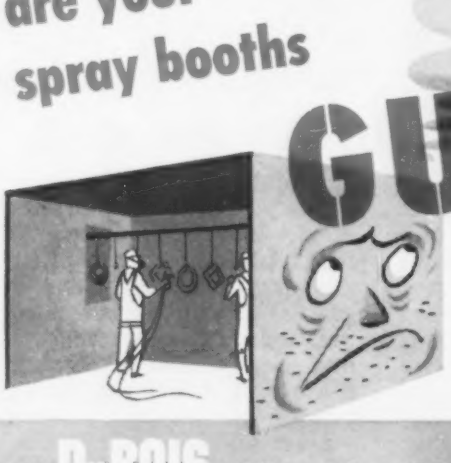
In operation, the various units work together. If necessary to shut down Section 3 to change one of the tools, the Toolometer controlling the dull tool terminates the cycle of Section 3, but Sections 1, 2, 4 and 5 remain in full automatic operation.

Dull Tools Replaced

The operator continues to feed parts into Section 1 without interruption. Cylinder blocks coming out of Section 2 are banked up in front of Section 3, while the parts banked behind Section 3 are fed into Section 4. After the tool setter replaces the dull tool with a fresh one from the Machine Control Unit, he re-sets the Toolometer and Section 3 returns to automatic operation in sequence with the other sections.

☐ Plugged Nozzles
☐ High Maintenance Costs ☐ Clogged Lines
☐ Foaming ☐ High Compound Consumption
☐ Loss of Reclaim ☐ Sludge in Reservoir
☐ Pump Break-downs ☐ Loss of Pressure
☐ Water Breaks

are your spray booths GUILTY of these costly crimes?



get DuBOIS engineered maintenance program

These ten spray booth criminals can be costing you thousands of unnecessary dollars every year. By installing DuBois Engineered Maintenance Program you can put a halt to excess maintenance costs immediately. DuBois' trained, experienced representatives will give your operation a thorough analysis and recommend highly specialized DuBois compounds, such as:

- KLARIFIANTS — water-wash. compounds that control overspray.
- FILMITES — coatings for dry areas of spray booths.
- PEEL FILMITE — flame-proof peelable plastic film.
- STRYPP — for periodic purging of old paint deposits in hydraulic system.

Contact DuBois today for details on this complete service.

FREE . . . spray booth maintenance check chart. Write for your weekly-monthly program for proper spray booth maintenance.

The DuBOIS Co., Inc. Dept. G.
Cincinnati 3, Ohio • Los Angeles 33, Calif.
Representatives and warehouses located coast to coast

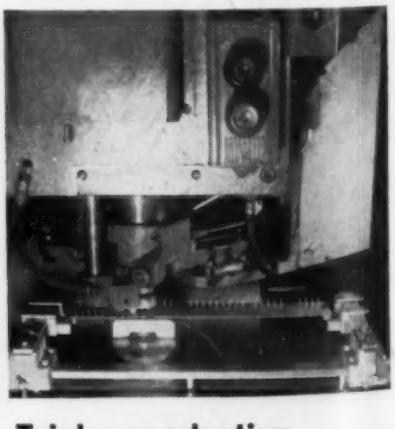
Riveting:

Machine speeds terminal lug installations for missiles.

Resistor boards used in many electronic devices such as controls for guided missiles contain a large number of terminal lugs for tying in the many electrical circuits.

Martin Aircraft, Baltimore, solved the problem of assemblying these boards by using an automatic riveting machine. The machine drills holes for the lugs and also installs the lugs at a rate of 18 per hr.

Previous to the use of the riveter, holes had to be drilled in one operation and the lugs installed in another. Production by this method was 6 per hr.



Triples production . . .

New Books:

"The Nation Looks at its Resources," edited by Henry Jarrett. Discusses leading issues in the field of natural resources. Covers land, water, nonfuel minerals, and energy resources. Resources for the Future, Inc., Mid-Century Conference Report Office, 1606 New Hampshire Ave., N.W., Washington 9, D. C. 432 p. $5.00.

"Manual on Industrial Water." Covers the nature and uses of industrial water. Includes up-to-date test methods and specifications. New sampling methods and definitions are given. American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa. 430 p. $5.00.

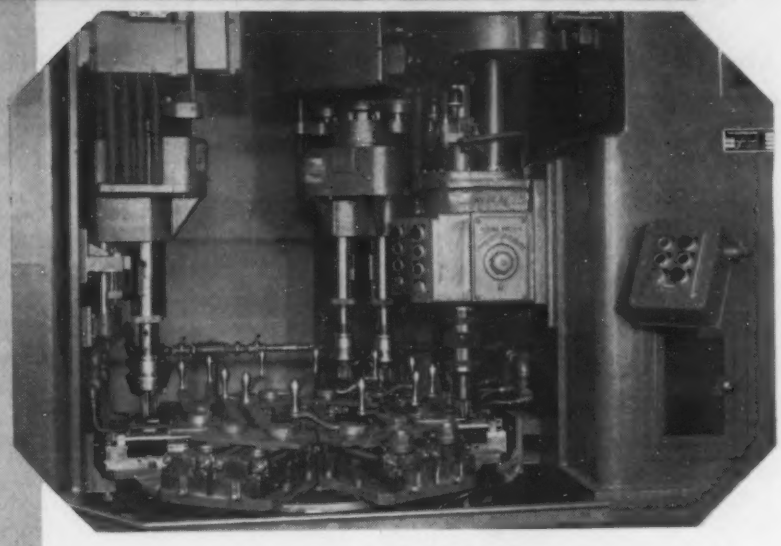
"Standard Metal Directory." This reference for the steel and metal industries covers iron and steel plants, ferrous and nonferrous metal foundries, metal rolling mills and smelters of nonferrous metals. Bardeen Press, Inc., 425 W. 25th St., New York. 900 p. $15.00.

"ASTM Standards on Metallic Electrical Conductors." Gives all ASTM Standards pertaining to metallic electrical conductors. Includes specifications, test methods and a classification of coppers. American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa. $3.25. 280 p.

"Testing of Stainless Steel Weldments," by Helmut Thielsch. Major inspection and testing procedures to evaluate the characteristics, properties and service behavior of stainless steel weldments are discussed. American Welding Society, 33 W. 39th St., New York 18. 26 p. $1.00.

"Deterioration of Materials," edited by Glenn A. Greathouse and Carl J. Wessel. Covers the climatic, chemical, physical and biological agents of deterioration. Also discusses the prevention of deterioration in metals, wood, paper, textiles, leather, plastics, rubber, paint and other materials. Reinhold Publishing Corp., 430 Park Ave., New York 22. $12.00. 835 p.

Another Cleveland Design to Speed Production!



COMBINATION CLEVELAND REAMING AND TAPPING MACHINE

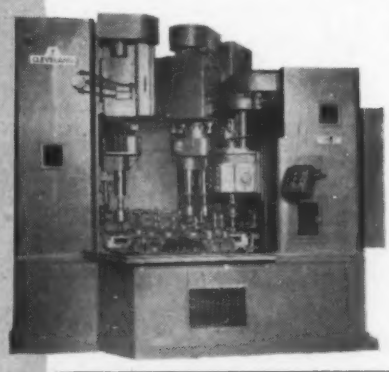
OPERATION: Rough taper ream two parts at a time. Finish taper ream two parts at a time. Tap with taper pipe tap two parts at a time.

PARTS: Union End Forgings.

PRODUCTION:

Size	Parts Per Cycle	Prod. at 100% Efficiency
1¼"-11½	2	316 per hour
1½"-11½	2	256 per hour
2"-11½	2	200 per hour

A vertical combination machine consisting of a heavy duty Cleveland 21" Power Index Table, mounted on an all welded and normalized steel base with columns on the rear of the table supporting two drill units, each with a two spindle head and one Cleveland Model F-2 two spindle heavy duty tapping unit.



Mounted on the top plate, twelve hand operated locating and clamping fixtures, with interchangeable jaw sets.

Write today for Catalog No. IA-124

CLEVELAND tapping machine co.

A Subsidiary of AUTOMATIC STEEL PRODUCTS, INC. • CANTON 6, OHIO

CONSTRUCTION: Colored Aluminum Panels Used

Architectural aluminum for outside walls of new Alcoa building combines bright color with low maintenance . . . Coloring impregnated in the metal by electrochemical process . . . Finish does not chip or peel.

A two story office building recently dedicated in Cincinnati features colored aluminum exterior walls. Built for the Aluminum Co. of America, Pittsburgh, to house the company's Cincinnati area sales staff the building is said to be the first to employ the company's new blue and gold architectural aluminum for outside walls.

The new line of colored aluminum finishes for exterior walls is the result of more than 25 years of research by Alcoa. The color is impregnated into the metal by a special electrochemical process.

Located outside Cincinnati's busy metropolitan area, the eye-catching new building features extruded aluminum panels with a gold finish on its front elevation, a blue finish on its rear wall. Ends of the 134 x 51 ft. bulding are of dark granite. Its colored, inter-locking aluminum panels are expected to begin a new trend in colored aluminum for commercial architecture.

Panels will not require exterior maintenance. Also the color finish will not chip, peel or rust. Several additional shades, including gray, brown and yellow are now available and others are under development, the company said.

FOR MORE DATA ON MATERIALS

More information on any item reported in this section may be obtained by using the reply card on page 135. Indicate the page on which the item appears and note exactly the information wanted.

Flexibility of design of this new type extruded wall will permit the addition of a third floor later with a minimum of alteration.

Blends With Other Buildings

Attractively styled marquees are located at front and rear elevations and faced with colored aluminum sheet and extrusions featuring special batten-seam aluminum roofs.

In striking contrast to the building's pale gold and medium blue aluminum walls are natural finish aluminum windows, window sills, mullions and coping. Also in natural finish aluminum are marquees, doors, column covers, and decorative trim. Satin-finished blue and gold exterior walls blend harmoniously with other commercial and residential buildings in the area.

Completely air conditioned, the

Low cost maintenance . . .

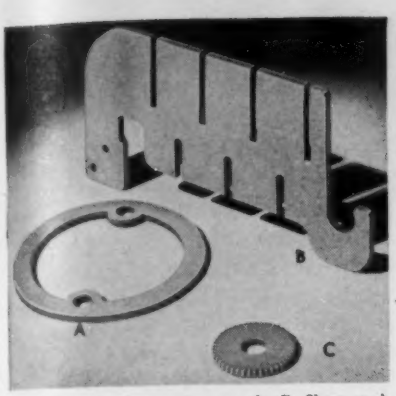
Turn Page

"I sure love to watch this fellow work — with those BUSTER ALLOY tools!"

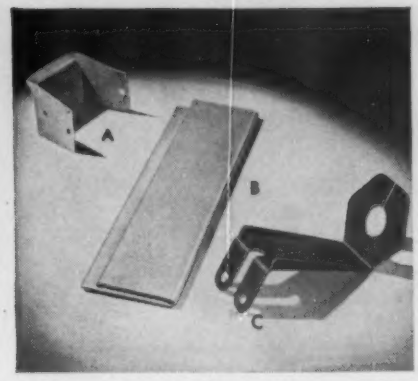
COLUMBIA TOOL STEEL COMPANY • CHICAGO HEIGHTS, ILL.

Producers of fine tool steels — All types immediately available through Sales Offices, Warehouses and Representatives in Principal Cities.

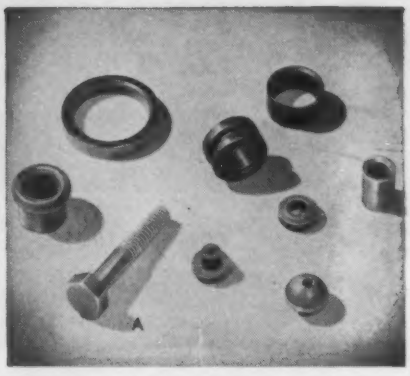
TOOL COLUMBIA STEELS



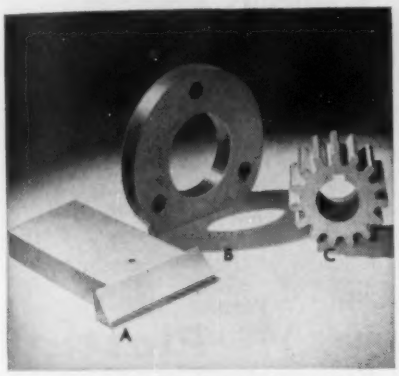
A. Sheet stock, shear strips, punch. B. Sheet stock, shear, punch blank, gang saw notches. C. Sheet stock, shear strips, punch blank, mill notches.



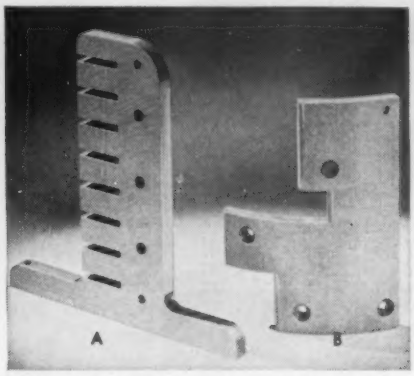
A. Sheet stock, shear strips, punch, form. B. Sheet stock, shear to size, drill, form. C. Sheet stock, shear strips, punch pieces, form in mold twice, rubber stamp twice.



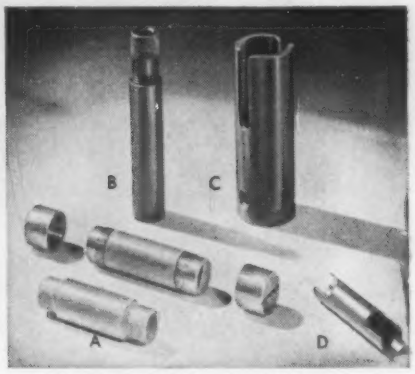
A. Rod (hexagonal), smooth saw, automatic screw machine, turn shoulder thread, champfer and cut off. Remainder are automatic screw machine parts made from Diamond Fibre by C-D-F.



A. Sheet stock, sand, smooth saw to size, smooth saw bevel, smooth saw corner cut out, drill. B. Sheet stock, band saw, turn OD, bore ID, smooth saw side, drill five blind holes with jig. C. Sheet stock, sand, band saw, rough bore ID, hob teeth, finish bore ID, machine keyway.



A. Sheet stock, sand, smooth saw, drill, smooth saw to shape, radius three corners, gang saw nothches. B. Sheet stock, band saw rough blanks, form, smooth saw width, length and shape, radius edges, drill with jig, countersink.



A. Tube, automatic screw machine, turn shoulders, champfer and thread end, thread other. B. Tube (long pieces), smooth saw, tap threads, screw machine, (small pieces) auto. screw machine, thread, knurl, champfer, cut off. C. Tube, smooth saw to length, punch twice, countersink. D. Tube, automatic screw machine, champfer, cut off, punch.

C-D-F fabricates and forms DIAMOND VULCANIZED FIBRE

FAST . . . AT LOW COST . . . DEPENDABLY

Vulcanized Fibre is a wonderful material if you know where to use it and how to buy it. We suggest on many jobs that it's best to do the fabrication and forming in C-D-F's shops. Why? Because C-D-F knows how. Since 1895 the company has put fibre to work in everything from buggy axle bushings to metal clad radio parts. The handling of thousands of set-ups for high speed, low cost production runs gives C-D-F an "experience bank" to draw from. Shop supervisors have a wealth of short cuts, little tricks that result in lower prices for you. They know the material and its peculiarities.

TOUGH, RESILIENT, STRONG

How long has it been since you examined the unique properties and wide range of C-D-F fibre grades? Vulcanized Fibre is arc resistant, mechanically strong, non-corroding, half the weight of aluminum. Repeated moistening and drying in forming insignificantly alters the nature, structure or quality of the fibre.

Since C-D-F has their own paper mill, uniform, quality control is made possible. Special grades are more easily developed. A good example is C-D-F Abrasive Fibre, a medium density fibre with excellent resin and grit adhesion, now widely used for abrasive discs.

A BIG, RELIABLE SOURCE

C-D-F does business with the largest tonnage users of sheet, rod and tube fibre in the world. This means good deliveries, good prices, reliable products for every new customer. You deal with a materials engineer, a C-D-F man who knows how to give you the most value in Diamond Vulcanized Fibre. If you want to improve design, simplify purchasing, speed production, use Diamond Fibre and the facilities of C-D-F. Write for catalog, free test samples, or send us your print for quotation.

CDF *Continental-Diamond Fibre*

CONTINENTAL-DIAMOND FIBRE COMPANY
NEWARK 85, DELAWARE

TUBES · BARS · FORGINGS · WIRE

PETERSON STEELS, INC.
UNION, NEW JERSEY
Detroit, Michigan • Chicago, Illinois

building's functional lobby makes extensive use of fluted aluminum extrusions on two walls with contrasting light and dark wood panels on the other two walls. Recessed lighting fixtures with special aluminum reflectors supply direct lighting inside the building.

Ductwork for heating and air conditioning is aluminum as are enclosures of the cooling tower for the building's air conditioning system.

Uses Bolt Fasteners

Enclosing front and rear walls of the structure, colored aluminum panels for the front and rear walls are 4 ft wide and range from 8 ft 5¾ in. to 17 ft 8 in. in length. Many of the panels include two windows; some of the smaller ones contain one window. All were easily secured to the building's lightweight steel frame by bolts. Entire thickness of the walls measure only 6 in.

Plastics:

Impregnated wood samples cut experimentation costs.

To halt the trend towards more expensive and less versatile wind-tunnel tests with models made of steel one aircraft company has turned to models made of plastics. These models are giving excellent results in the reproduction of aerodynamic characteristics in small scale.

Engineers, at Martin Aircraft Co., Baltimore, in cooperation with the plastics group of its Research Div., have developed usable plastic model components such as jet engine nacelles. The components are economical to mold, can be produced in many variations, and are made with pressure-measuring tubes embedded in the structure.

Typical aircraft part . . .

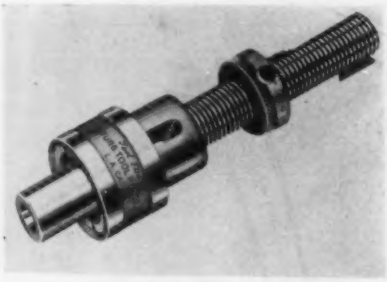
NEW EQUIPMENT

New and improved production ideas, equipment, services and methods described here offer production economies . . . for more data use the free postcard on page 135 or 136

New gun simplifies and improves stud welding

Stud welding is made simpler than ever by this versatile streamlined NS-9 stud welding gun. Accurate stud alignment on the workpiece has been simplified by elimination of the side cable loop required on earlier models, and electrical connections have been reduced from three to one in the interest of increased operating efficiency and simplified maintenance. The gun is available with two different sizes of cable, one for welding studs with diameters up to ½ in. and the other for 10 gage to 1 in. diam and greater. The following factors contribute to the gun's increased versatility: design accommodates greater range of stud length without changing adaptors or other accessories; arc length can be adjusted without disassembly; coil design offers greater lifting power and improved efficiency. *Nelson Stud Welding Div.*

For more data circle No. 28 on postcard, p. 135.



Adjustable adapter shank for multiple spindle work

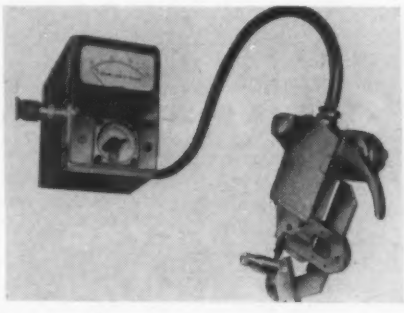
Adjustable adapter shank Toolflex tool holders can be furnished with Morse taper sleeve, straight bore or tap collets. Suitable for center applications they can operate as close as ⅞ in. centers. Simplicity of construction features four main parts, assuring long service-free life. Oil, heat and wear resistant Neoprene insert provides universal float that corrects for both parallel and angular misalignment, preventing bell mouthing and oversized holes or torn, oversized threads. *Burg Tool Mfg. Co.*

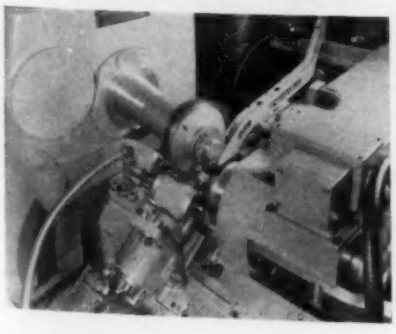
For more data circle No. 29 on postcard, p. 135.

Micrometer automatically controls grinding cycle

An electronic micrometer is capable of controlling automatically a grinding machine's cycle and guaranteeing tolerances as low as 0.00004 in. The control gage, known as the Electro-Autosizer, makes possible highest quality results using semi-skilled labor and dispenses with necessity for air conditioned gage rooms. The instrument can withstand rough handling, is self-compensating for wear, temperature and moisture changes. The device can be adapted to almost any machine, and can be hooked up easily in about 15 min. *Industrial Gauges Corp.*

For more data circle No. 30 on postcard, p. 135.





Machine chamfers and shaves simultaneously

Accurately controlled chamfering of the tips of the teeth of automotive pinions at the same time the teeth are being shaved is accomplished on a No. 8 Fellows Fulltool gear shaving machine tooled for fully automatic operation. Two tools are employed, the shaving tool and a rotary serrated-tooth chamfering tool which is located on a movable slide below and at the left of the shaving tool. An air cylinder automatically advances and withdraws the chamfering tool slide in timed relation with shaving cycle. *Fellows Gear Shaper Co.*

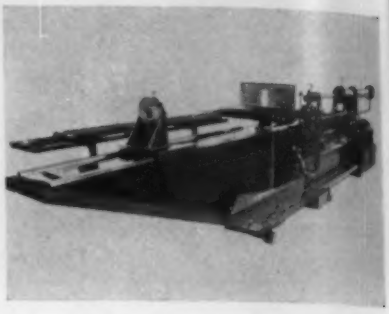
For more data circle No. 31 on postcard, p. 135.

Turn Page

Versatile broaching machine for boring bars

For greater precision and faster, more accurate setups in the broaching of boring bars for the trade, a new horizontal broaching machine has been custom built to handle 8-in. diam bars of any length and up to 1¼ in. square. Machine base is I beam construction giving maximum strength and rigidity. Follower and pull head of the ram are of fixed-in-line centers. Work table is raised or lowered to suit operation in line with fixed center of machine; it rotates 45°. Controls and setup adjustments are handy to operator standing at work table. *Sturdy Broaching Service.*

For more data circle No. 32 on postcard, p. 135.

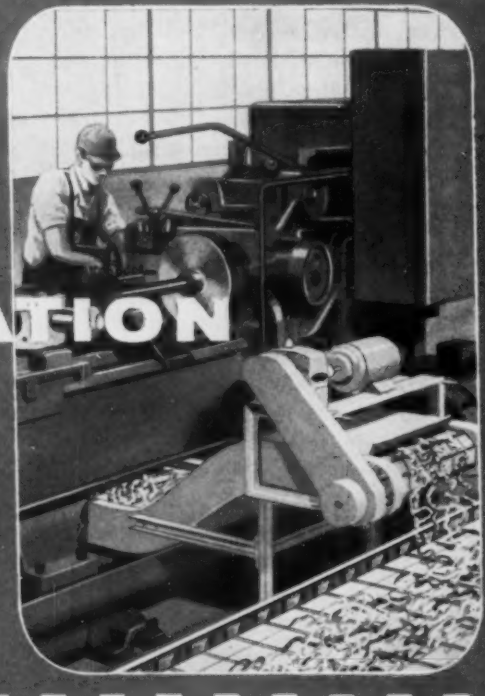


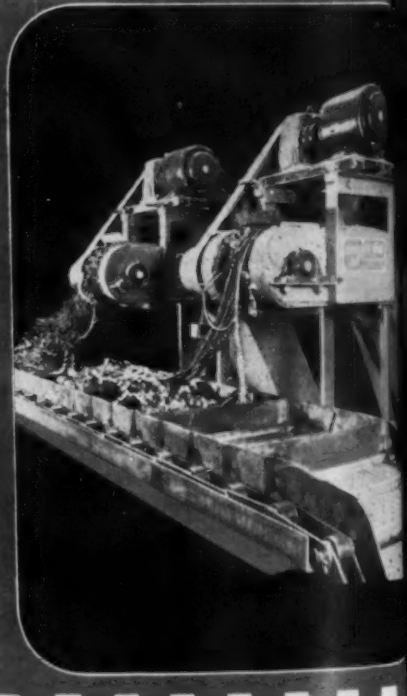
New electromagnetic pump moves liquid metals

A new pump is designed to move liquid metals within cooling or heating systems, to force liquid metals into forms in diecasting operations, and for general usage wherever these metals must be forced from point to point. Operated on an electro-magnetic principle, the new pump has no moving parts, no packing glands. An electrical current is passed through the metal to be pumped in a direction perpendicular to a magnetic field which surrounds the metal, producing a force which sets the metal in motion within the pumping section. A pump of this type will effectively pump those fluid metals which have a lower electrical resistance than that of the pumping section's walls. Flow rates of the EM pumps are positively controlled from zero to maximum flow by an adjustable autotransformer. The new, ac conducting type EM pump operates from single phase, 60-cycle ac voltages. *Callery Chemical Co.*

For more data circle No. 33 on postcard, p. 135.

May-Fran
...first
for
AUTOMATION
in
scrap
handling
systems





The CHIP-TOTE conveyor permits complete utilization of machine tools by eliminating shut-down for manual scrap removal.

It handles a continuous flow of hot, wet or dry chips, turnings and borings from any multiple spindle automatic machine.

Vacuum lift speeds up materials handling

Slings and hooks can be eliminated from lifting or moving operations with added safety to the operator and the product by the use of a new vacuum cup lift. The Vac-Lift provides a method for handling flat, non-porous materials such as sheet metal, stampings and housing, boxes, etc. By merely placing the vacuum cup on the work a safety-tight seal is created. Easy one-hand operation permits accurate spotting of the load. The operator releases the load with finger tip control. Unit comprises air-bloc hoist, pendent throttle, and vacuum cup. *Ingersoll-Rand Co.*

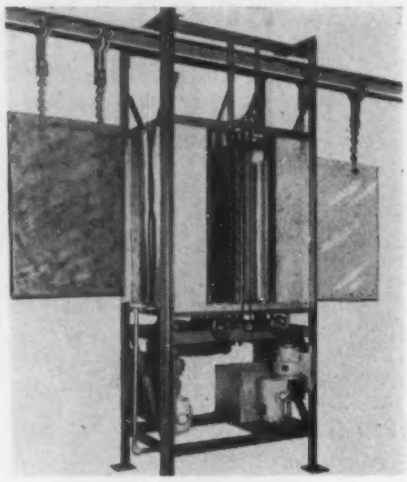
For more data circle No. 34 on postcard, p. 135.

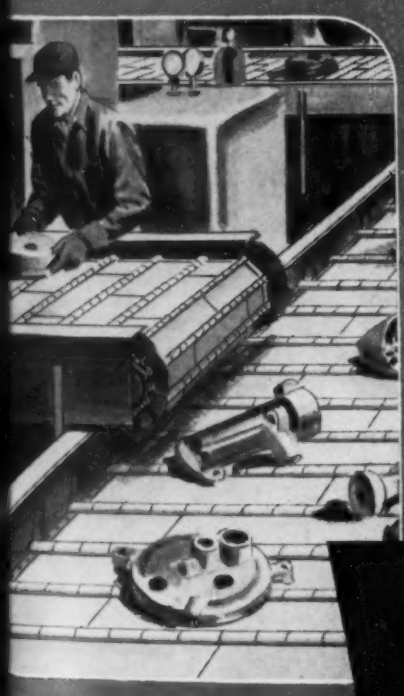
Industrial scrubber cleans polished metal sheets

The Cathode Plate Scrubber removes unwanted residue resulting from the buffing of cathode plates that are to be coated in the electrolytic deposition process. The machine insures that the buffed plates will have the clean surface essential for proper adhesion of the metal deposit. The metal plates, suspended by hooks, are carried through the scrubber by an overhead monorail conveyor. A spray and cylindrical scrubbing brushes scour off residual material, and a clear water rinse leaves the plates clean as they leave the machine. Two ¾ hp drip-power motors power the scrub brushes which turn by means of a chain drive. A ½ hp variable speed motor for the feed roll drive moves the plates through the machine at a speed of 2⅔ to 8 fpm. The spiral coiled scrub brushes are 47 in. long and have stainless steel backing. Fill is crimped black nylon. *Fuller Brush Co. Machine Div.*

For more data circle No. 35 on postcard, p. 135.

Turn Page





Hinged-steel belting handles scrap as well as hot heavy and abrasive castings. Belt is economical . . . maintenance-free.

Now is the time to put AUTOMATION to work . . . Now is the time to cut production costs . . . May-Fran engineers design and build complete scrap handling systems for the automatic removal of machine turnings or chips. May-Fran conveyors will transmit scrap to ultimate point of disposal.

Press Scrap systems can be made completely automatic. Hinged-steel belt will take scrap from presses, handle it through blanking, shearing, forming and baling processes, and deliver it to rail cars.

May-Fran is prepared to engineer, fabricate and install complete conveyor systems to your specifications.

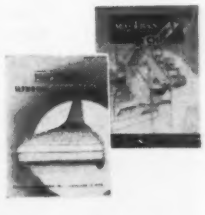
DESIGNERS AND ENGINEERS OF COMPLETE SCRAP HANDLING SYSTEMS

MAY-FRAN ENGINEERING, INC.

Write today for complete information on how an automatic scrap removal system will cut your production costs.

Bulletin MF-530 describes the new Hinged-Steel conveyor belt.

Bulletin MF-640 describes the Chip-Tote conveyor which removes scrap from operating machines.



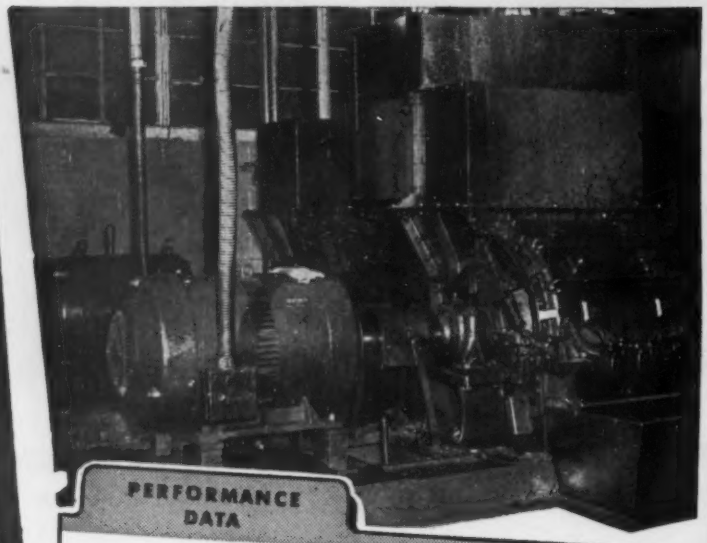
5003-MF

1698 CLARKSTONE ROAD
CLEVELAND 12, OHIO

More "CRUSHING" FACTS ON American CRUSHER PERFORMANCE

Case History No. 15

$60,000 ANNUAL GROSS PROFITS!
WITH TWO AMERICAN METAL TURNINGS CRUSHERS



PERFORMANCE DATA

TWO CRUSHERS:	Model 3800's
AVERAGE AGE:	35 months
MONTHLY TONNAGE:	1200–1500 tons metal turnings
PARTS COST:	to date, for both crushers: $1599.80
COST PER TON:	$0.03, including standby parts

THE experience of many blue chip manufacturers have shown that there are three important profit sources in every American installation: (1) American-reduced chips bring $4 more per ton on scrap market (2) Up to 50 gallons of recovered cutting oil per ton of reduced turnings (3) less storage . . . easier handling.

Let American show you how you can turn your scrap into profit.

WRITE for Bulletin: "Metal Turnings Crusher."

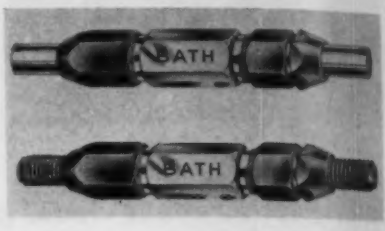
American PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

1439 MACKLIND AVE., ST. LOUIS 10, MO.

Reversible gages

Gaging costs are claimed by the manufacturer to be cut in half with a new line of thread and cylindrical reversible gages. The

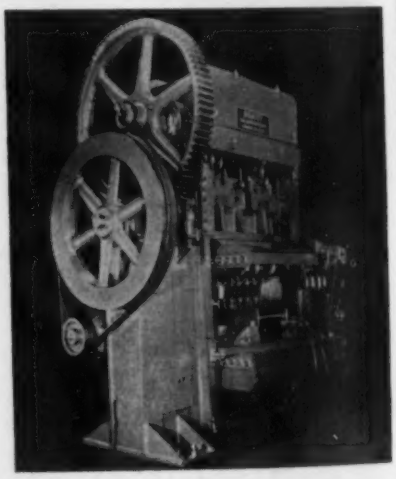


gages are made from selected steel and have a luster-lapped finish. They are adjustable for use as depth gages and have go and not-go color identification. *John Bath & Co., Inc.*

For more data circle No. 36 on postcard, p. 135.

New web punch

Designed for structural steel fabricating shops, a guillotine beam web punch uses time-saving adjustable web punching tools for punching webs of beams, angles, and flat plates. The machine has six punching units, each individually controlled, which facilitates setting up to various gage lines. Expensive setting-up time is eliminated and



downtime is reduced. Maximum setting to outside units is 33 in.; minimum setting between units is 2⅜ in. Punch and die are automatically synchronized. Tool arrangement is for use with spacing table. The punch is of 200-ton capacity and is built with double housing for added strength. *Beatty Machine & Mfg. Co.*

For more data circle No. 37 on postcard, p. 135.

Turn Page

Just as a RHINOCEROS *needs protection . . .*

IRON and STEEL *Need* PROTECTION

If your product is made of iron or steel, and exposed to the elements, protect it against the ravages of rust by Hot-Dip Galvanizing — the best possible rust preventive when applied by Hanlon-Gregory. For longer life, greater uninterrupted service and substantial savings in maintenance, specify Hot-Dip Galvanizing . . . SEAL IT IN ZINC.

HANLON-GREGORY GALVANIZING COMPANY

Pittsburgh, Pennsylvania

The World's largest Job Galvanizing Plant

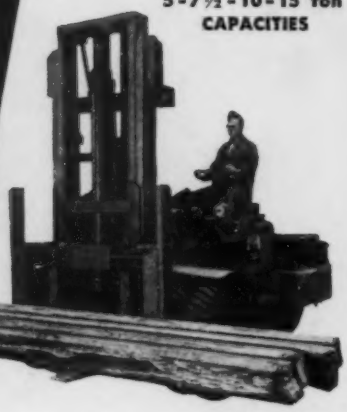
IN THE HEART OF THE STEEL INDUSTRY

HOT-DIP GALVANIZING

galvanizing . . . pickling . . . painting . . . oiling

RENT OR BUY
HEAVY-DUTY FORK
LIFTRUK
on the
"DAY-BY-DAY
EARN-ITS-WAY
PLAN"

5-7½-10-15 ton
CAPACITIES



If you can reasonably use a Heavy Duty LIFTRUK for at least two hours a day average, to improve the movement of goods in process or reduce materials handling operations, then you should be interested in this unusual "rent-or-pay-as-you-use" plan. Proper cost accounting methods often show that man-hours saved, storage space gained, or time in transit reduced, add up to a profit well above the payments required for LIFTRUK for purchase or rental charges.

Write for "Earn-Its-Way" Plan to

SILENT HOIST & CRANE CO.
Pioneers of Heavy Duty Materials Handling Equipment
851 63rd Street, Brooklyn 20, N. Y.

with this WISCONSIN-POWERED UNIT!

This sturdy unit takes a six-foot-wide bite in any kind of snow, loading from 7 to 12 cubic yards of snow per minute in trucks or throwing it clear. Builder is Krause Industries, Baraboo, Wisconsin and the snow blower is constructed to mount easily and quickly on the Hough Payloader Tractor-Shovel. A Wisconsin Heavy-Duty Air-Cooled Engine provides the power.

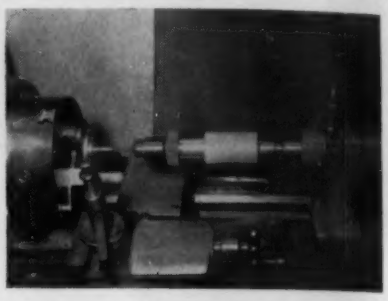
Equipment builders and buyers are choosing Wisconsin Engines over all other types in the 3 to 36 hp. range . . . as the most satisfactory and foolproof power to fit both the *job* and the *machine*. You'll find a model and size available to fit every power requirement . . . 4-cycle single-cylinder, 2-cylinder and V-type 4-cylinder models, 3 to 36 hp. Write for Bulletin S-164.

WISCONSIN MOTOR CORPORATION
World's Largest Builders of Heavy-Duty Air-Cooled Engines
MILWAUKEE 46, WISCONSIN

A 8121-⅓

Small precision threads

Probems of threading, tapping and drilling small precision threads on lathes, turret lathes and screw machines are lessened by a new tool known as Thread-Quill. Many second operations can be avoided with the aid of the tool. Thread-

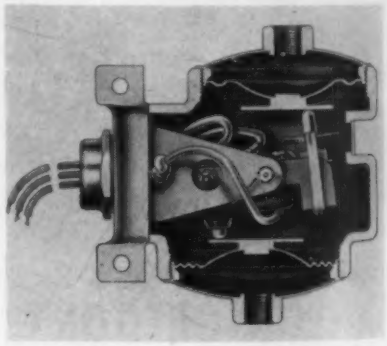


Quill controls the forward travel of the drill, tap or die and feels any delay in the cutting action. A pressure release allows the tool and sleeve to spin with the workpiece. When bed turrets on screw machines or turret lathes fail to locate in the same position it is possible to float tools in place of the fixed position method. Thread-Quill and its floating action compensates for misalignment. *D.S.C. Machine Co.*

For more data circle No. 38 on postcard, p. 135.

Pressure difference switch

Meletron Model 462 senses any pressure difference from 0 to 99 psi between two pressures within the working range of 0.05 to 100 psi. The unit will actuate an elec-

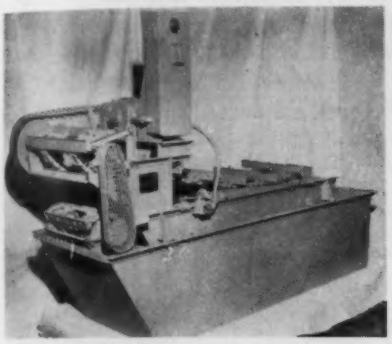


tric circuit on increase or decrease of any predetermined pressure difference within range of the switch selected. Readily adjusted in the field by means of an adjustment ratchet. Switch operates in any position. *Barksdale Valves.*

For more data circle No. 39 on postcard, p. 135.

Self-cleaning filter

Flotation, progressive filtering and settling are the three basic principles of liquid clarification incorporated in a new automatic self-

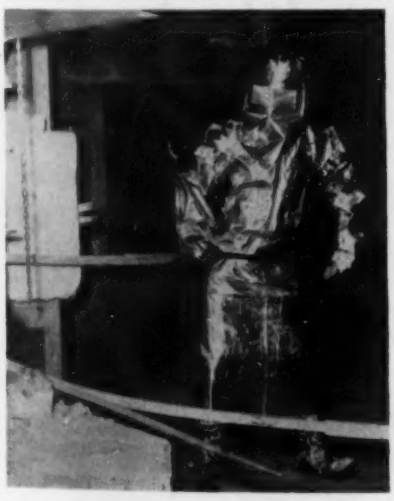


cleaning liquid filter for industry. The machine is said to keep coolant in clean usable condition for long periods. Capacities range from 10 to 1000 gpm with efficiency reported at 91 to 99 pct. Can be used as a single unit or central system. *Henry Equipment Co.*

For more data circle No. 40 on postcard, p. 135.

Heat resistant suits

Made of aluminized fabric new Fyre-Armor industrial suits are said to stand up against 2500°F heat and make it possible for one to conduct his job with safety in in-



dustrial operations where high radiant heat is a problem. Suits are available in 10 models, allow freedom of movement and mobility and weigh 5-10 lb. Hoods, leggings, aprons, boots and coats may be obtained separately. *Far-Ex Corp.*

For more data circle No. 41 on postcard, p. 135.

Turn Page

CM HOISTS

Put your OVERHEAD plant space to work!

You pay plenty for overhead plant space. It's valuable. Use it to move or store materials with CM Hoists. You'll have extra floor space for more valuable operations.

Many Thousands at work in leading plants

CM COMET ELECTRIC HOISTS 1/8 to 2 tons

- Push button or pendant rope control. Anyone can operate.
- Use on 110 or 220-440 volt lines. Extremely low power cost.
- Fully enclosed mechanism. Lifetime lubricated. Minimum maintenance.
- Flexible Herc-Alloy steel load chain. Upper-lower safety limits.
- Durable, safe, versatile, efficient.

COMET Catalog 150 ...18 pages of information Get a copy today for your file.

ALSO Meteor Wire Rope Electric Hoists (1/2 to 5 tons), Cyclone Hand Hoists (1/4 to 10 tons), CM Pullers (3/4 to 6 tons), CM Trolleys and CM Cranes.

➡ Call the CM distributor for catalogs, prices and quick delivery from stock

CM HOISTS AND CHAIN

CHISHOLM-MOORE HOIST DIVISION
COLUMBUS McKINNON CHAIN CORPORATION
TONAWANDA, NEW YORK
REGIONAL OFFICES: NEW YORK, CHICAGO, CLEVELAND
In Canada: McKINNON COLUMBUS CHAIN LIMITED, ST. CATHARINES, ONTARIO

"BEST $1286 WE EVER SPENT!"

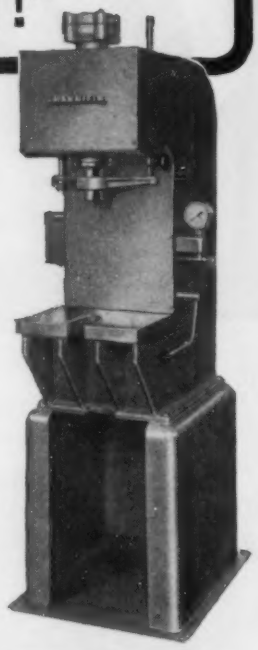
That's the price of this 5-Ton HANNIFIN Press*

A lot of production men have made such comments about this versatile little hydraulic press.

They like the way you can adjust it to the exact force you need for each job, all the way from 1 ton to 5 tons. The backstroke is adjustable, too, so the ram just clears the work on any job. Fast-acting controls. Prompt delivery from stock.

WRITE. Complete information and prices on the Hannifin line of 1- to 10-ton Hydraulic Presses will be sent on request.

*Price complete with motor and starter F.O.B. our press plant, St. Marys, Ohio, subject to change without notice.



HANNIFIN

Hannifin Corporation, 513 S. Wolf Road, Des Plaines, Illinois

Erie BUCKETS ARE A *Specialty* — NOT A SIDELINE

Right from the start we thought enough about buckets to make them our specialty. That was 34 years ago. They're still our bread and butter.

Today, thousands of Erie units all over the world are turning in top performance. That's because they were built with a complete understanding of what they had to do.

Why not let our engineers review your set-up. There's no obligation. And, based on past experience, we're sure we can offer a helpful suggestion.

Write for BULLETIN 403, Dept. A124

FORMERLY ERIE STEEL CONSTRUCTION COMPANY

ERIE STRAYER CO.

SAME PEOPLE • SAME PRODUCTS • JUST A NEW NAME

5124 GEIST ROAD • ERIE, PENNSYLVANIA

Induction heater

New 25 kw high frequency vacuum tube induction heater is engineered for heavy duty industrial use. The entire cubicle is pressurized. Ambient air is drawn into the heater near the top, filtered, blown downward through the oscillator, through a baffle, into the rectifier section, and then exhausted through a grille

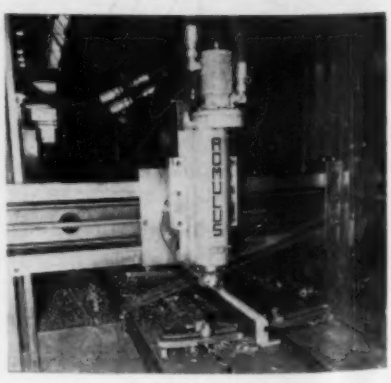
on the rear panel. The electronic heater has a built-in water cooling system. It features automatic timing for each unit operation. Operations can be either manual or automatic depending upon the production setup for the job. Its applications include brazing, soldering, annealing, hardening and heating for forging. *Allis-Chalmers Mfg. Co.*

For more data circle No. 42 on postcard, p. 135.

Hydraulic spindles

This 1200 rpm, 25 hp milling head removes steel at the rate of 20 cim. These heads can be furnished in any power range up to 150 hp. *Romulus Tool & Engineering.*

For more data circle No. 43 on postcard, p. 135.



Silicone rubber gum

Designated as SE-30, a new, low-shrinkage, general-purpose silicone rubber gum is being used in compounds from which parts requiring close tolerances may be produced. Compounds for conventional type molding, extrusion, calendering, knife coating or dip coating are readily formulated with the new gum. They offer high tensile strength, low compression set and good resistance to elevated temperatures. *General Electric Co.*

For more data circle No. 44 on postcard, p. 135.

Wet sandpapers

Superior wet sanding properties embodied in two new super-tough, very fine waterproof sandpapers make them suited for quality metal and wood finishing work. Flexibility, toughness, durability and

leathery feel of coarser grades are retained in the new 500-A and 600-A grit papers. The manufacturer claims an outstanding uniformity of grain for such fine grades of coated abrasives. The silicon-carbide grain papers in sheets. *Behr-Manning Corp.*

For more data circle No. 45 on postcard, p. 135.

Bearing material

New bearing material runs with or without oil; operates at temperatures of −120° to +500°F. It is said to have exceptional wear characteristics at extreme temperatures and provides an excellent bearing when used in conjunction with oil. The material contains over 40 pct lubricative solids; has an utimate compression strength of 22,700 psi. It can be machined to close tolerances. *Booker-Cooper, Inc.*

For more data circle No. 46 on postcard, p. 135.

adds a magic touch

Hendrick Ornametal

More and more metal fabricators are realizing the sales benefits that stem from using Hendrick Ornametal in their product design. Whether you require perforated metal for radiator enclosures, stove panels, kitchen cabinets, clothes and broom closets, lockers or similar applications, you can be certain there's a Hendrick Ornametal design suited for your exact needs.

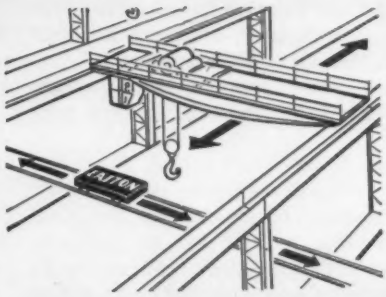
Lightweight and supplied in special bright finish Hendrick Ornametal is made of cold rolled steel suitable for painting or plating. For more complete details, contact Hendrick direct.

Hendrick
MANUFACTURING COMPANY

SEE OUR CATALOG IN SWEET'S

37 DUNDAFF ST., CARBONDALE, PA. • Sales Offices in Principal Cities
Perforated Metal • Perforated Metal Screens • Wedge-Slot Screens • Architectural Grilles • Mitco Open Steel Flooring • Shur-Site Treads • Armorgrids

Cross-Bay Transfer
TRADE MARK



The EASTON motorized cross-bay transfer car is designed to provide lateral handling of materials to supplement overhead crane service in modern multiple bay plants. The cross-bay movement of the automatic transfer car provides a universal handling system able to spot a load anywhere on the floor of the plant. The same car system may also be used for moving materials between plant buildings.

EASTON CAR & CONSTRUCTION COMPANY · EASTON, PA.
Sales Offices in New York
Philadelphia
Pittsburgh

AN EASTON 100-TON cross-bay transfer car showing general details of construction.

EASTON®

A-1046

It gets its fuel through 1/4" tubing at pressures up to 1,700 psi

Meet the "Boss of the Crawlers"—Caterpillar Tractor Co.'s new 150 D.B. hp giant that toys with tons of earth, plays marbles with huge boulders, topples trees like tenpins.

Superior Tube supplies metal gullets through which such landscape levelers gulp their fuel.

Through ¼ inch O.D. tubing, diesel fuel is injected to cylinders at pressures up to 1,700 psi. So fuel injection tubing must be clean, have tremendous burst strength and resistance to fatigue. To meet Caterpillar's stringent specifications, Superior selects C-1008 Low Carbon Steel Tubing, draws it to size 250/255" O.D. x 0575/0675" I.D., then tests its mechanical properties to the utmost.

Result: heavy wall tubing with Rockwell hardness of B-65 maximum—capable of being cold upset without difficulty and cold formed into loops and bends without excessive springback. Bore is of uniform diameter, smooth and specially cleaned, and fracture testing and inspection at 15 power magnification assure freedom from cracks or seams of a depth greater than 5/1000 of an inch!

Scrupulous care in preparing, drawing and testing other grades of alloy and stainless Superior tubing makes them first choice for lubricating and cooling lines, governor shafts, valve spacers and valve push rods. One of our more than 55 analyses should be *your* choice, too, if you need trustworthy tubing and special help in adapting it to your use. Write us about your current tubing problem. We'll send you complete information and the appropriate catalog or technical bulletin by return mail. Superior Tube Company, 2004 Germantown Ave., Norristown, Pa.

Round and Shaped Tubing Available in Carbon, Alloy and Stainless Steels; Nickel and Nickel Alloys; Beryllium Copper; Titanium; Zirconium.

All analyses .010" to ⅝" O.D. Certain analyses in light walls up to 2½" O.D.

Superior Tube

The big name in small tubing

West Coast: Pacific Tube Company, 5710 Smithway St., Los Angeles 22, Calif. RAymond 3-1331

The Iron Age SUMMARY . . .

Ingot rate advances to 81 pct of capacity . . . Production now 35 pct higher than last summer . . . Steel scrap prices decline again.

Production . . . The sizzling speed of steel market recovery continues to knock all predictions into a cocked hat. Production is gaining faster than the forecasters can belatedly revise their outdistanced predictions.

Steelmaking operations this week are scheduled at 81.0 pct of rated capacity. That's one point better than last week, and it's another new high for the year. The steel ingot production index for this week is estimated at 120 (1947-49=100). During its sensational recovery from the summer low steel production has risen 35 pct.

New Orders . . . But fast as production is gaining, it is still not keeping up with the torrid pace of new orders. Despite very careful screening by the mills, new orders are being accepted so fast that delivery promises are being extended on nearly all products.

Delivery . . . An important new development in the market is that some automakers have now started placing orders beyond the normal lead time (lead time is the time between placing of order and delivery of steel). Previously they had been rather complacently depending on mill suppliers to hold space open for them on their rolling schedules in anticipation of actual orders to be placed later.

But the mills are facing mounting pressure from other customers who are willing to place orders far in advance of needs in order to be sure of getting steel when they need it. Result is a turnabout in the market. Mills are informally allocating sheets.

Some customers in the Mid-west are ordering 90 days ahead of delivery, some are even willing to place orders 120 days before delivery. But such orders are being scrutinized very carefully by mills who are wary of "paper" orders that might be cancelled later if the steel isn't needed.

Distribution . . . There's no doubt that steel's number one customer, the auto industry, has bullish plans for 1955. General Motors President, Harlow H. Curtice, predicts 5.8 million cars next year. That's 10 pct more than the industry will turn out in 1954.

Size of automotive orders already indicates exceptionally good steel business — at least through the first quarter. High carbon wire used in upholstery is at least as tight as cold-rolled sheets.

Buying by appliance makers is again moving up strongly. This indicates excellent output at a time when this industry generally goes into a seasonal deep-freeze.

Steel Output, Operating Rates

Production	This Week†	Last Week	Month Ago	Year Ago
(Net tons, 000 omitted)	1,919	1,915	1,822	1,972
Ingot Index				
(1947—49=100)	119.5	119.2	113.4	122.8
Operating Rates				
Chicago	90.0	89.5*	79.0	94.5
Pittsburgh	78.0	77.0	74.0	80.0
Philadelphia	71.0	70.0	68.5	91.0
Valley	79.0	79.0*	71.0	85.0
West	81.5	84.0*	83.0	88.0
Detroit	93.0	88.0	97.0	85.0
Buffalo	97.5	97.5	87.5	99.5
Cleveland	86.0	80.5	81.0	87.0
Birmingham	64.0	64.5	64.5	96.5
S. Ohio River	85.0	88.0	87.0	81.0
Wheeling	93.0	81.0*	81.0	83.0
St. Louis	83.0	82.0	91.0	85.0
East	65.5	66.0*	45.0	85.5
Aggregate	81.0	80.0	76.5	87.0

*Revised. †Tentative

Prices At A Glance

(cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite prices				
Finished Steel, base	4.797	4.797	4.798	4.632
Pig Iron (gross ton)	$56.59	$56.59	$56.59	$56.59
Scrap, No. 1 hvy (gross ton)	$32.33	$32.83	$34.00	$33.83
Nonferrous				
Aluminum, ingot	22.20	22.20	22.20	21.50
Copper, electrolytic	30.00	30.00	30.00	29.75
Lead, St. Louis	14.80	14.80	14.80	13.30
Magnesium, ingot	27.75	27.75	27.75	27.00
Nickel, electrolytic	67.67	63.08	63.08	63.08
Tin, Straits, N. Y.	90.625	91.00	92.25	82.25
Zinc, E. St. Louis	11.50	11.50	11.50	10.00

STEEL PRODUCT MARKETS

First Quarter Could Be Tight

Cold-rolled sheet backlog deeper . . . Pipeline jobs plus railroad pickup will help plates . . . Galvanized, enameling sheet demand beyond expectations . . . Bars improve.

◆ A WORD of caution to steel consumers: Watch out for the first quarter of 1955. Potentially, it could be a lot tighter than the present quarter.

There are a few things in the future that will bear watching. First, pipeline construction. There are a number of such projects in the offing, and the word around steel sales offices is that they are likely to break in first quarter. This will tighten up a relatively easy plate market.

Second, it looks as if the railroads, feeling good over improved business, will be getting back into the market for more cars. This means light plates, sheets, light structural sections.

From a steel demand standpoint the overall economic picture for 1955—at least for the first two quarters—is mighty encouraging. Besides pipelines, railroads, and automobiles, there are oil well drillings, construction, farm implements and supplies, appliances, electric power. Even coal mining shows signs of improving.

Meanwhile, demand for the following products has surged far beyond expectations: Cold-rolled sheets, galvanized sheets, enameling sheets, long ternes. Gaining more strength are hot-rolled sheets, strip, carbon bars, alloy bars, manufacturers wire, spring wire. Mechanical specialties and pressure tubing are picking up. Tinplate is expected to improve. Oil country goods still strong. Buttweld pipe and structurals are holding firm.

SHEET AND STRIP . . . Cold-rolled: orders on the books for February, even March in **Chicago**; as late as February in **Pittsburgh**; into January on wide widths, February or later on narrower widths in **Cleveland**; February and March orders being placed by most **Detroit** automotive buyers, although biggest car makers are managing to stay within 45-day lead time. In the **East**, delivery can be had in 6-7 weeks. Hot rolled has backed up to early January in **Chicago**; gaining strength in other markets. Strip demand is improving. Even coated specialties are moving up.

STAINLESS . . . Possibility of a price increase due to higher labor and material costs may force some hedge-buying on top of an already-improved market due largely to automotive and appliance demand. A 4½¢ per lb increase in nickel price may be straw that breaks camel's back for stainless mills who have held price line since 1953 due to slow early 1954 market and competition with aluminum. As an indication of the strengthened market, **Cleveland** reports stainless strip deliveries now on 6-8 week basis compared with 3-4 weeks six weeks ago due to heavy accumulations of semi-finished inventories which are now non-existent.

GALVANIZED SHEETS . . . Backlogs in some areas reportedly have reached an "embarrassing" level; 22 weeks on continuous and up to 18 weeks on hot-dip at one large mill in the **East**. Situation is almost as bad in **Chicago**, where one mill is booked solid through first quarter. Virtually the same story in other producing centers.

ENAMELING SHEETS . . . Demand for this product has reached the frantic stage due to heavy appliance consumption coupled with limited productive capacity.

CARBON BARS . . . Both hot-rolled and cold-finished are gaining strength although lead time is still short. Still room for improvement. Reinforcing bars slowing seasonally.

ALLOY BARS . . . November shipments are shaping up as the best in over a year. On the basis of present orders December will be approximately 10 pct better than November. Some cautious buyers have placed business for first-quarter delivery. If demand gains more strength there may be some bottlenecks in hot-top and heat treating.

STRUCTURALS . . . Standard structurals could be better. Overall, demand is just about holding steady. Wide-flange beams showing signs of improvement.

PLATES . . . The market has good prospects for improvement. Meanwhile delivery promises are relatively short although producers consider business fair rather than poor.

PIPE AND TUBING . . . Mechanical and pressure tubing picking up. Buttweld in good demand but easing slightly as jobbers scrutinize year-end inventories.

WIRE . . . In summary, the pickup in industrial wire has softened the impact of seasonal decline in merchant products. The effect has been a slight easing in overall demand. This market could be extremely strong should the strengthened industrial wire demand collide head-on with a spring pickup in merchant wire.

WAREHOUSE . . . Although actual business volume has improved only mildly, the strong pickup at mill level has prompted distributors to call a halt to inventory-reduction plans. Looking ahead, they can see a definite improvement shaping up and don't want to be caught short.

GENERAL . . . Kaiser Steel Corp. has completed work on its blooming mill, which was increased from 36-in. to 46-in.

Purchasing Agent's Checklist

METALWORKING: Census of industry is valuable sales tool . . . . p. 65

STAINLESS: Price pressure growing . . . . . p. 68

STEEL: Inventory policies differ . . . . . p. 69

ORE: Slow Lakes season ends early . . . . . p. 71

TRADE: Former-import nations now roll own steel . . . . . p. 77

Comparison of Prices

(Effective Nov. 30, 1954)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

	Nov. 30 1954	Nov. 23 1954	Nov. 2 1954	Dec. 1 1953
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	4.05¢	4.05¢	4.05¢	3.925¢
Cold-rolled sheets	4.95	4.95	4.95	4.775
Galvanized sheets (10 ga.)	5.45	5.45	5.45	5.275
Hot-rolled strip	4.05	4.05	4.05	3.925
Cold-rolled strip	5.79	5.79	5.82	5.613
Plate	4.225	4.225	4.225	4.10
Plates wrought iron	9.30	9.30	9.30	9.30
Stainl's C-R strip (No. 302)	41.50	41.50	41.50	41.50
Tin and Ternplate: (per base box)				
Tinplate (1.50 lb.) cokes	$9.05	$9.05	$9.05	$8.95
Tinplate, electro (0.50 lb.)	7.75	7.75	7.75	7.65
Special coated mfg. ternes	7.85	7.85	7.85	7.75
Bars and Shapes: (per pound)				
Merchant bars	4.30¢	4.30¢	4.30¢	4.15¢
Cold-finished bars	5.40	5.40	5.40	5.20
Alloy bars	5.075	5.075	5.075	4.875
Structural shapes	4.25	4.25	4.25	4.10
Stainless bars (No. 302)	35.50	35.50	35.50	35.50
Wrought iron bars	10.40	10.40	10.40	10.40
Wire: (per pound)				
Bright wire	5.75¢	5.75¢	5.75¢	5.525¢
Rails: (per 100 lb.)				
Heavy rails	$4.45	$4.45	$4.45	$4.325
Light rails	5.35	5.35	5.35	5.20
Semifinished Steel: (per net ton)				
Rerolling billets	$64.00	$64.00	$64.00	$62.00
Slabs, rerolling	64.00	64.00	64.00	62.00
Forging billets	78.00	78.00	78.00	75.50
Alloy blooms, billets, slabs	86.00	86.00	86.00	82.00
Wire Rod and Skelp: (per pound)				
Wire rods	4.675¢	4.675¢	4.675¢	4.525¢
Skelp	3.90	3.90	3.90	3.75
Finished Steel Composite: (per pound)				
Base price	4.797¢	4.797¢	4.798¢	4.632¢

	Nov. 30 1954	Nov. 23 1954	Nov. 2 1954	Dec. 1 1953
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$61.19	$61.19	$61.19	$61.19
Foundry, Valley	56.50	56.50	56.50	56.50
Foundry, Southern, Cin'ti	60.43	60.43	60.43	60.43
Foundry, Birmingham	52.88	52.88	52.88	52.88
Foundry, Chicago	56.50	56.50	56.50	56.50
Basic del'd Philadelphia	60.27	60.27	60.27	60.27
Basic, Valley furnace	56.00	56.00	56.00	56.00
Malleable, Chicago	56.50	56.50	56.50	56.50
Malleable, Valley	56.50	56.50	56.50	56.50
Ferromanganese‡, cents per lb.	9.50¢	9.50¢	9.50¢	10.00¢
‡ 74-76 pct Mn base.				
Pig Iron Composite: (per gross ton)				
Pig iron	$56.59	$56.59	$56.59	$56.59
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$32.50	$32.50	$35.50	$36.50
No. 1 steel, Phila. area	*32.00*	32.50	33.00	31.50
No. 1 steel, Chicago	*32.50*	33.50	33.50	33.50
No. 1 bundles, Detroit	27.50	27.50	26.50	27.50
Low phos., Youngstown	34.50	34.50	35.50	36.50
No. 1 mach'y cast, Pittsburgh	42.50	42.50	42.50	45.50
No. 1 mach'y cast, Philadel'a	42.00	42.00	42.50	42.00
No. 1 mach'y cast, Chicago	*41.50*	42.50	43.50	37.50
Steel Scrap Composite: (per gross ton)				
No. 1 heavy melting scrap	*$32.33*	$32.83	$34.00	$33.83
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.38	$14.38	$14.38	$14.38
Foundry coke, prompt	16.75	16.75	16.75	16.75
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	30.00	30.00	30.00	29.75†
Copper, Lake, Conn.	30.00	30.00	30.00	30.125
Tin, Straits, New York	*90.625*†	91.00*	92.25	82.25
Zinc, East St. Louis	11.50	11.50	11.50	10.00
Lead, St. Louis	14.80	14.80	14.80	13.30
Aluminum, virgin ingot	22.20	22.20	22.20	21.50
Nickel, electrolytic	67.67	63.08	63.08	63.08
Magnesium, ingot	27.75	27.75	27.75	27.00
Antimony, Laredo, Tex.	28.50	28.50	28.50	34.50

† Tentative. ‡ Average. * Revised.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

←To identify producers, see Key on P. 174→

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Bethlehem *B3*	58.00	58.50	59.00	59.50	.....
Birmingham *R3*	52.38	52.88	.....	.....	.....
Birmingham *W9*	52.38	52.88	.....	.....	.....
Birmingham *U4*	52.38	52.88	56.50	.....	.....
Buffalo *R3*	56.00	56.50	57.00	.....	.....
Buffalo *I11*	56.00	56.50	57.00	.....	.....
Buffalo *W6*	56.00	56.50	57.00	.....	.....
Chicago *I4*	56.00	56.50	56.50	57.00	.....
Cleveland *A5*	56.00	56.50	56.50	57.00	61.00
Cleveland *R3*	56.00	56.50	56.50	.....	.....
Daingerfield *L3*	52.50	52.50	52.50	.....	.....
Duluth *I4*	56.00	56.50	56.50	57.00	.....
Erie *I4*	56.00	56.50	56.50	57.00	.....
Everett *M6*	.....	61.00	61.50	.....	.....
Fontana *K1*	62.00	62.50	.....	.....	.....
Geneva, Utah *C7*	56.00	56.50	.....	.....	.....
Granite City *G2*	57.90	58.40	58.90	.....	.....
Hubbard *Y1*	.....	.....	56.50	.....	.....
Minnequa *C6*	58.00	59.00	59.00	.....	.....
Monessen *P6*	56.00	.....	.....	.....	.....
Neville Isl. *P4*	56.00	56.50	56.50	.....	.....
Pittsburgh *U1*	56.00	.....	.....	57.00	.....
Sharpsville *S3*	56.00	56.50	56.50	57.00	.....
So. Chicago *R3*	56.00	.....	56.50	.....	.....
Steelton *B3*	58.00	58.50	59.00	59.50	64.00
Swedeland *A2*	58.00	58.50	59.00	59.50	.....
Toledo *I4*	56.00	56.50	56.50	57.00	.....
Troy, N. Y. *R3*	58.00	58.50	59.00	59.50	64.00
Youngstown *Y1*	.....	.....	56.50	57.00	.....
N. Tonawanda *T1*	.....	56.50	57.00	.....	.....

DIFFERENTIALS: Add 50¢ per ton for each 0.25 pct silicon over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.50 pct manganese over 1 pct, $2 per ton for 0.5 to 0.75 pct nickel, $1 for each additional, 0.25 pct nickel. Subtract 38¢ per ton for phosphorus content 0.70 and over.

Silvery Iron: Buffalo, *H1*, $66.25; Jackson, *J1*, *G1*, $65.00. Add $1.00 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 17 pct. Add $1 per ton for 0.75 pct or more phosphorus. Add 75¢ for each 0.50 pct manganese over 1.0 pct. Bessemer ferrosilicon prices are $1 over comparable silvery iron.

STAINLESS STEEL

Base price cents per lb. f.o.b. mill.

Product	301	302	303	304	316	321	347	410	416	430
Ingots, rerolling	16.25	17.25	18.75	18.25	28.00	22.75	24.50	14.00	.....	14.25
Slabs, billets, rerolling	20.50	22.75	24.75	23.75	36.25	29.50	32.25	18.25	.....	18.50
Forg. discs, die blocks, rings	38.50	38.50	41.50	40.50	60.00	45.50	50.75	31.00	31.75	31.75
Billets, forging	29.50	29.75	32.25	31.00	46.50	35.25	39.50	24.00	24.50	24.50
Bars, wires, structurals	35.25	35.50	38.25	37.25	55.50	42.00	46.75	28.75	29.25	29.25
Plates	37.25	37.50	39.75	39.75	58.75	45.75	51.25	30.00	30.50	30.50
Sheets	41.25	41.50	48.75	43.75	62.75	50.50	59.25	34.25	41.25	34.75
Strip, hot-rolled	29.75	32.00	36.75	34.25	53.25	41.00	46.50	26.25	.....	27.00
Strip, cold-rolled	38.25	41.50	45.50	43.75	62.75–63.00	50.50–50.75	59.25	34.25	41.25	34.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11*; Brackenridge, Pa., *A3*; Butler, Pa., *A7*; McKeesport, Pa., *U1*; Washington, Pa., *W2*, *J2*; Baltimore, *E1*; Middletown, O., *A7*; Massillon, O., *R3*; Gary, *U1*; Bridgeville, Pa., *U2*; New Castle, Ind., *I2*; Ft. Wayne, *J4*

Strip: Midland, Pa., *C11*; Cleveland, *A5*; Carnegie, Pa., *S9*; McKeesport, Pa., *F1*; Reading, Pa., *C2*; Washington, Pa., *W2*; W. Leechburg, Pa., *A3*; Bridgeville, Pa., *U2*; Detroit, *M2*; Canton-Massillon, O., *R3*; Middletown, O., *A7*; Harrison, N. J., *D3*; Youngstown, *C5*; Sharon, Pa., *S1*; Butler, Pa., *A7*; Wallingford, Conn., *U3* (.25¢ per lb higher) *W1* (.25¢ per lb higher); New Bedford, Mass., *R6*.

Bar: Baltimore, *A7*; Duquesne, Pa., *U1*; Munhall, Pa., *U1*; Reading, Pa., *C2*; Titusville, Pa., *U2*; Washington, Pa., *J2*; McKeesport, Pa., *U1*, *F1*; Bridgeville, Pa., *U2*; Dunkirk, N. Y., *A3*; Massillon, O., *R3*; Chicago, *U1*; Syracuse, N. Y., *C11*; Watervliet, N. Y., *A3*; Waukegan, *A5*; Canton, O., *T5*; Ft. Wayne, *I4*.

Wire: Waukegan, *A5*; Massillon, O., *R3*; McKeesport, Pa., *F1*; Ft. Wayne, *J4*; Harrison, N. J., *D3*; Baltimore, *A7*; Dunkirk, *A3*; Monessen, *P1*; Syracuse, *C11*; Bridgeville, *U2*.

Structurals: Baltimore, *A7*; Massillon, O., *R3*; Chicago, Ill., *J4*; Watervliet, N. Y., *A3*; Syracuse, *C11*.

Plates: Brackenridge, Pa., *A3*; Chicago, *U1*; Munhall, Pa., *U1*; Midland, Pa., *C11*; New Castle, Ind., *I2*; Middletown, *A7*; Washington, Pa., *J2*; Cleveland, Massillon, *R3*; Coatesville, Pa., *C15*.

Forged discs, die blocks, rings: Pittsburgh, *C11*; Syracuse, *C11*; Ferndale, Mich., *A3*; Washington, Pa., *J2*.

Forgings billets: Midland, Pa., *C11*; Baltimore, *A7*; Washington, Pa., *J2*; McKeesport, *F1*; Massillon, Canton, O., *R3*; Watervliet, *A3*; Pittsburgh, Chicago, *U1*; Syracuse, *C11*.

Prices Continue Downtrend

Mills place more orders at lower prices . . .
Hot metal from relit blast furnaces cuts scrap use
. . . Composite Price falls 50¢ to $32.33.

◆ DOWNTREND in iron and steel scrap prices gained impetus this week from new mill buying at lower prices in several areas. Market tone was generally softer even in those areas where prices held at last week's levels. Major exception was Detroit, where the market refused to be influenced by out-of-district weakening.

THE IRON AGE Heavy Melting Steel Scrap Composite Price fell 50¢ to $32.33 per gross ton as a result of lower prices for No. 1 steel in Chicago and Philadelphia. No. 2 grades in Pittsburgh, Chicago turnings, and Philadelphia electric furnace grades also showed declines. And railroad scrap was off in several areas.

Pittsburgh and Cleveland particularly stressed that additional hot metal from relit blast furnaces was paring scrap use at the openhearths. Still-healthy mill inventories coupled with year-end inventory reduction tendencies added to market easing.

Pittsburgh . . . Another purchase established No. 1 heavy melting steel firmly at $33 this week. The deal also involved No. 2 steel and No. 2 bundles at $29 and $26, respectively, off $1 from last week. The market has sagged here temporarily due partly to the influence of additional hot metal from blast furnaces blown in in recent weeks. Feeling is that prices will strengthen at year's end or in early 1955.

Chicago . . . With price breaks in the East, the Chicago market began to slip back with the mill buying outlook showing little improvement. While steelmaking grades were affected, turnings were in particularly bad shape in a very slow market. Though railroad grades continued to command good purchasing prices, consumers were holding back on sales at the top of the grade. A slip in some rail grades appeared likely, with the market already moving down in rerollers and 2 ft rail. Cast as well followed the weakened market trend. While industrial grades still commanded a good premium, orders in dealer No. 1 heavy melting at $33 confirmed the slide in this grade.

Philadelphia . . . General easing in the market is reflected by lower prices in openhearth and electric furnace grades this week. Railroad grades ran counter to the trend and edged slightly higher. There is not much buying pressure from local mills, most of which have at least adequate stocks. Year-end inventory reduction may be at the root of the softness in the face of a rising ingot rate.

New York . . . Diminished domestic consumer buying has softened this market somewhat. Steelmaking and blast furnace grade prices have slipped about $1. Exports, however, continue to move well, and are commanding a $1 to $2 premium in this area. Cast movement to pipe foundries stays brisk.

Detroit . . . This market is still holding itself up with local purchases and some orders from the Valley, the only other consuming area that appears willing to draw scrap from the Motor City. First automotive lists to close indicated that prices would hold to present levels for a time in spite of previously bearish predictions. Some active purchasing at the close of the month at quoted prices contributed to the feeling of continued strength here despite falling prices elsewhere.

Cleveland . . . Tonnage being offered mills is the highest this year but consumers cooled off last week on major buys. Overall tone remains firm with no price changes. A major local producer is starting up his last blast furnace this week. If ingot rate increase continues, additional outside scrap purchases will become necessary. Industrial lists are closing this week with offered tonnage 50 pct over October due to auto production. Two Valley producers bought a small tonnage of secondary grades last week at low range of market and announced they were final purchases for year.

Birmingham . . . With export prices (which have been influencing prices paid by mills) about as high as they can go, the scrap business seems to have settled down. Mills show no indication of cutting back prices, but dealers seem a little uneasy about first of the month orders. Scrap is moving into the yards in fair quantities and the higher prices are expected to keep it coming. The cast market seems to be softening a little but thus far there has been no cutback in prices.

St. Louis . . . Steel mills in this district placed orders for December shipment at unchanged prices. Heavy railroad lists closing during the week brought an average of 50¢ below previous quotations.

Cincinnati . . . At least two barge loads of No. 2 bundles were shipped to Pittsburgh mills last week at Cincinnati brokers' prices of $21-$22. These grades are little used in the Cincinnati area due to high percentage of electric furnace capacity. Industrial lists closing at same to slightly lower levels than last month.

Buffalo . . . Softer tendencies in other markets were reflected locally as the top mill consumer placed orders for substantial tonnages at declines of $1 per ton for steelmaking grades.

Boston . . . A weaker tone prevails in the New England scrap market this week with No. 2 heavy melting and No. 1 bundles quoted $1 lower. Weakness of tone extends to other steelmaking grades but scattered buying at the old prices maintained the quotations unchanged. Electric furnace material is doing well in the immediate Boston area but prices are lower in outlying districts.

West Coast . . . Officially, the scrap picture in the San Francisco Bay Area continues about the same. But it is rumored that some dealers are paying over mill prices for export scrap. And there is talk that some mills have been paying over quoted prices, but they won't admit it.

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Nickel Price Boosted 4.5c

Canadian export price now 64.5¢ . . . Mill products also hiked . . . First rise in nearly 2 years attributed to rising production costs . . . London copper down—By R. L. Hatschek.

◆ THANKSGIVING holiday cut into business last week and made it a generally quiet period with the single exception of the price increase announced by International Nickel Co. of Canada. This was the first boost in nearly 2 years and is a definite indication that increasing the supply of nickel is not accomplished without cost.

Fairly substantial boost in nickel alloy mill products—especially the ones that take a lot of labor—indicate how big a percentage labor is.

In London, where the last Thursday in November is no holiday, copper prices dropped fairly substantially, though they are still several cents higher than domestic quotations. This, however, had no effect on new copper prices here, but did cause a scrap price dip.

NICKEL . . . Increasing production costs are cited as the reason International Nickel Co. raised its prices last week. The increase in refined nickel was 4.5¢ per lb, bringing the f.o.b. Port Colborne price to 64.50¢ including the 1.25¢ U. S. import tariff. Last nickel price change was Jan. 14, 1953.

Similar changes were made in prices for nickel oxide sinter and other forms of primary nickel. The boost in nickel, Monel and Inconel mill products ranged from a flat 4.5¢ per lb up to 15.5¢ in cold-rolled "A" nickel sheet.

COPPER . . . Declining prices on the London Metal Exchange are generally named as the reason scrap prices slipped here late last week. London, closing the week at about the equivalent of 33.125¢ per lb, had slipped from over 35¢ earlier. Drop was caused by abstinence of consumers from the market.

Effect here was a quick cut in custom smelter and ingot maker buying prices, followed shortly by a trimming of dealer buying prices. The decline put dealer buying prices only about ½¢ per lb above what they were before the copper strike precipitated the shortage.

As for the shortage of refined copper, it is still expected to last into the New Year. Government aid, according to Office of Defense Mobilization last week, has come to a total of 32,692 tons. Of this, 16,358 was from government "inventory" and 16,334 tons was copper diverted from stockpile. In addition, about 2600 tons of Canadian copper was diverted from the stockpile for use by Canadian consumers.

ZINC . . . Purchases of zinc continue in good volume with none of the major sellers registering any complaints. Diecasters, spurred by production of 1955 auto models, head the list of good consumers. Steel industry is buying for its December galvanizing needs and, with copper supplies improving, the brass mills are in the market for at least satisfactory tonnages.

And the trade is now waiting for General Services Administration to come into the market for December stockpile tonnage.

Pricewise, most transactions are at firm figures, though the December average price is affixed to quite a number of deals. London prices edged upward a bit late last week. Price there on Friday was at a New York equivalent of slightly over 11.51¢.

LEAD . . . Bureau of Mines reports lead consumption for the first 9 months of the year was about 9 pct under the first 9 months of 1953. Totals were 822,000 tons for the 1954 period and 905,535 tons for the first three quarters of the preceding year.

Breakdown for the 9-month period showed use in batteries at 250,469 tons, off from 280,587 tons; consumption by cable makers at 94,565 tons, down from 109,895 tons; and use in tetraethyl lead at 123,960 tons, up from 120,200 tons in the 1953 period.

ALUMINUM . . . Progress report from Kaiser Aluminum & Chemical Corp. indicates its new high-speed cold rolling mill now under construction at Trentwood, Wash., will be completed in March 1955. The 60-in. four-high mill is the key unit in a $1.5 million expansion announced last June and will add 18,000 tons of annual thin-gage aluminum sheet capacity to the plant. This will bring Trentwood's total sheet and plate capacity to nearly 200,000 tons a year.

In the secondary aluminum ingot field, one Chicago smelter is reported to have boosted prices late last week by ¼¢ to ½¢ per lb. Strong market demand is cited as the main reason.

MERCURY . . . Market price of mercury has been slowly slipping in the past few weeks as consumers stay away as much as possible. Their feeling is that prices should come down substantially in the near future as a result of increasing production in the U. S. and in Mexico. So far the result has been to force European sellers down—but only a bit.

Daily Nonferrous Metal Prices

(Cents per lb except as noted)

	Nov. 24	Nov. 25	Nov. 26	Nov. 27	Nov. 29	Nov. 30
Copper, electro, Conn	30.00	....	30.00	30.00	30.00	30.00
Copper, Lake, delivered	30.00	....	30.00	30.00	30.00	30.00
Tin, Straits, New York	90.625	....	90.875	....	90.625	90.625*
Zinc, East St. Louis	11.50	....	11.50	11.50	11.50	11.50
Lead, St. Louis	14.80	....	14.80	14.80	14.80	14.80

Note: Quotations are going prices **Tentative*

Monthly Average Metal Prices

(Cents per lb except as noted)

Average prices of the major nonferrous metals in November, based on quotations appearing in THE IRON AGE, were as follows:

Electrolytic copper, Del'd Conn. Valley	30.00	Zinc, E. St. Louis	11.50
		Zinc, New York	12.00
Lake copper, delivered	30.00	Lead, St. Louis	14.80
Straits tin, New York	91.138	Lead, New York	15.00